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## RECLAMATION RECORD, VOLUME XI.

### FOR THE YEAR 1920.

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# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURE INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

VOLUME 11, No. 1

PRICE {NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

JANUARY, 1920



## PRESIDENT WILSON URGES ENACTMENT OF SOLDIER-SETTLEMENT LEGISLATION.

We must see to it that our returning soldiers are assisted in every practicable way to find the places for which they are fitted in the daily work of the country. This can be done \* \* \* in at least one very great field, by creating new opportunities for individual enterprise. The Secretary of the Interior has pointed out the way by which returning soldiers may be helped to find and take up land in the hitherto undeveloped regions of the country which the Federal Government has already prepared or can readily prepare for cultivation, and also on many of the cut-over or neglected areas which lie within the limits of the older States, and I once more take the liberty of recommending very urgently that his plans shall receive the immediate and substantial support of the Congress.—*From the message to Congress, December 2, 1919.*

## THE RECLAMATION OF WASTE LAND FOR HOMES AND THE RECLAMATION OF ILLITERATES FOR GOOD CITIZENS.<sup>1</sup>

By Judge Will R. King, Chief Counsel of the Reclamation Service.

Mr. Chairman, ladies and gentlemen, it is my purpose to present briefly for your consideration some facts with reference to the present reclamation work of the Department of the Interior in connection with the arid lands of the West, the plans which Secretary Lane has in mind for the extension of this work throughout the country for the benefit of the soldier and sailor, and the further program by which the Secretary proposes to reduce the alarming illiteracy which now obtains in this great Democracy. My subject might appropriately be called "The reclamation of waste land for homes and the reclamation of illiterates for good citizens."

Seventeen years ago there was enacted by Congress what is known as the Newlands Act, for the purpose of reclaiming arid lands of the Western States, which territory Congress in 1890 fixed as all that section of country west of the one hundredth meridian. Work was immediately begun under this Act, and up to the present time there has been expended thereunder about \$120,000,000. As a result something like 1,750,000 acres of previously unproductive lands have been transformed into successful farms and are now producing some of the most abundant crops in the world. In addition about 1,500,000 acres outside of Federal projects are being supplied with water by the Reclamation Service under what is known as the Warren Act.

When I say these reclaimed lands are among the most abundant crop producers of the world, I do so without fear of being accused of exaggeration. The reason for this great production lies in a happy combination of water and sunshine. The water is supplied and applied where and when needed, while in humid sections the farmer has no control over the spasmodic showers upon which he depends. In much of the arid region the sun shines almost constantly

throughout the year. In all dry countries there is sunshine, in abundance. When I was in Yuma, Ariz., a few months ago, I saw a sign over one of the hotels to the effect that three meals would be furnished free on every day on which the sun did not shine. I was told that the proprietor had furnished free meals under this promise on but one day in three years. In the Imperial Valley in Southern California it is a rarity, and incidentally a treat, to see a cloudy day. With constant sunshine and plenty of water the land produces from four to six crops of alfalfa annually.

The full effect of the extended application of sunshine to the land as bearing upon the growing of crops is not usually appreciated. An interesting example is found in far-off northern Alaska. Strange as it may seem to those who have not investigated the subject, there are enormous areas of good agricultural land to be found in this far northern section of our country, notwithstanding the fact that the ground thaws out only about 3 feet below the surface, while for perhaps 15 to 20 feet below that point the ground is always frozen. The productiveness of these lands, is largely due to the fact that when the sun does shine in that land it shines constantly both day and night. With this constant 24 hours per day sunshine, in conjunction with moisture rising from below, aided by occasional rainfalls, crops are successfully raised within a much less period of time than is the case farther south where light and darkness alternate every 12 hours.

The manner in which arid deserts change under irrigation to productive farms and successful communities is interesting and instructive. I am reminded of the testimony of Mr. J. B. Lippincott, an engineer, who was formerly our project manager on the Yuma irrigation project in Arizona, which testimony was given in a trial at Tucson last May. Mr. Lippincott referred to the project as a "going concern," and on cross-examination was asked what he meant by that

<sup>1</sup> Address delivered Sept. 26, 1919, before the International Farm Congress, at Kansas City, Mo.



expression. Responding to the question, he said: "I visited that project yesterday and carefully traveled over and observed it from one end to the other, and when I saw lands which but a few years ago produced nothing but sage-brush, cacti, and mesquite, and were inhabited only by rattlesnakes, horned toads, Gila monsters, and the like, and subject to the effects of sand storms and the bleaching sun, without a showing of useful produce, and now observe the same lands converted into gardens, grain and alfalfa fields, and orchards of orange and other citrus fruits, practically every crop one might desire to raise being grown there, with but little unused soil to be found; and when I see built upon these lands irrigation canals, with an abundance of flowing water; wells, windmills, silos, fine barns, and the farmers housed in dwellings requiring no apology from any one for their appearance or conveniences; when I find general prosperity prevailing among the farmers there; when I observe that some are making thousands of dollars annually from 80 acres; that some are renting their farms for as much as \$30 per acre net, when at one time they could not get 30 cents per acre; when I find no one complaining for the lack of crops, or on account of failure of crops; when I find an abundance of water supply for everyone who desires it and find it in productive use; when I find but little if anything lacking that should be upon farms of like communities, I feel safe in concluding that the Yuma project is 'a going concern.'"

The Yuma project is but 1 of about 26 "going concerns" of a like character, constructed by the United States Reclamation Service of the Department of the Interior under the Newlands Act of 1902. They lie in 15 different States stretching from the Canadian line to Mexico. Our Milk River project in Montana uses water that flows through Canada, while our Rio Grande project in New Mexico and Texas delivers water, under an international treaty, for the irrigation of lands in old Mexico. In this beneficent work of reclamation our engineers have tunneled mountains, changed rivers, and constructed some of the greatest dams in the world. Nearly a half million people have secured homes on these lands, which have produced crops since 1905 having a total value in excess of \$250,000,000. Government irrigation has added to the land values of the country more than a half billion dollars.

The fund with which the Reclamation Service has been working in the past comes from the proceeds from the sale of public lands. That fund is now very depleted. If this great work is to be much extended our good Government will be required to provide additional sources of revenue. The recent war has called attention to the fact that greater food production should be encouraged in this country. The problem of the high cost of living is an acute one.

We hear of a shortage of sugar, while great areas of good sugar-beet lands lie idle and unproductive. We have millions of acres of idle land in this country which eventually could be brought under cultivation to reduce living costs, furnish employment, and provide homes. There are, roughly speaking, 15,000,000 acres of irrigable arid lands, 80,000,000 of swamp lands, and 200,000,000 of lands covered only with stumps and shrubbery, much of which could be converted into productive farms and prosperous homes. In addition, there are probably 100,000,000 acres of logged-off lands not valuable for growing crops but suitable for range purposes for sheep, goats, and other animals, and which would add greatly to the value of cultivated farms in the same vicinity.

The United States is fortunate in having at the head of the Department of the Interior, at Washington, a broad and liberal statesman, ever on the alert to perform a service to his country. Secretary Lane long ago clearly foresaw the needs of the reconstruction period through which we are now passing. On May 31, 1918, he addressed a letter to the President, in which he pointed out certain postwar problems that would arise, and suggested the desirability of reclaiming our waste and unused land throughout the country—in the North, East, and South, as well as the West—for the purpose of furnishing employment to the returning soldiers and sailors, and later providing them with unusual opportunities to secure homes of their own. His idea was to prepare, ready for use, tracts of land, each sufficient in size to make at least a hundred farms, and let the soldiers and sailors take these farms and develop prosperous agricultural communities or settlements, paying back the actual cost in small payments over a long period of years. In his annual message to Congress, on December 2, 1918, President Wilson indorsed the Secretary's plan, and it has since received hearty approbation from patriotic people of high standing in all parts of the country, including the late Col. Theodore Roosevelt. A bill to vitalize this idea into law was introduced in the Sixty-fifth Congress by Representative Edward T. Taylor, of Colorado, and Senator Henry L. Myers, of Montana. It was favorably reported out of committee in both Houses, but was caught in a legislative jam in the closing hours of that Congress and never came to a vote on the floor. The same program is covered by a bill introduced in the present Congress by Representative Frank W. Mondell, of Wyoming, and Senator Reed Smoot, of Utah. This bill has been favorably reported out of the House Committee on the Public Lands, but has not yet come to a vote. It is commonly referred to as the Mondell bill or the Lane soldier settlement bill.

The Western States are practically a unit for this proposed legislation. They know from experience the benefit which comes from the reclamation of lands



that heretofore have been unproductive, while the people of the East and the South and the Middle States have not had this experience.

I ask you to reflect for a moment upon the magnitude of the benefit which would ensue from a reclamation of all of the waste and unproductive lands of this country. As I have already stated, there are more than 300,000,000 acres, now worthless to the country, a large part of which could eventually be converted into homes and producing fields. That means a little less than 500,000 square miles of territory. Does it occur to you just what those figures represent? This area is equal to the combined area of the three great States bordering on the Pacific Ocean. If you will omit Florida, and you may substitute a small State or two such as Vermont, it equals that of all of the States bordering on the Atlantic seaboard. It equals in extent of territory the entire British Isles, consisting of England, Ireland, Scotland, and Wales, with 80,000,000 of people; it exceeds in size the combined areas of Belgium, France and Italy, which countries also have, all told, about 80,000,000 of inhabitants.

When we consider that by the reclamation of our vast areas of unused lands we can double our population without annexing outside territory or people, and that we can add to the United States more land probably than Germany could have acquired had she conquered the Allies and carried out the conspiracy of conquest which she was undertaking, does the problem not seem worth while? The territory which we may thus peacefully conquer is an unpeopled land and not a territory wherein we would have to destroy people residing there or share the property with them, but a territory where nothing worth noticing is being produced, where there are neither human lives nor valuable vegetation. We would not "stoop to conquer," but we would rise to conquer. Does it not then behoove us and the people throughout this country to make intelligent efforts in the direction of such reclamation.

Secretary Lane's plan to help the boys of our Army and Navy not only will bring a greatly needed development of our waste lands but will also provide much work for the unemployed. I understand that investigations made a short time ago in 87 cities of this country showed 310,000 more applicants for jobs than there were jobs available. Many of these jobless applicants were men who had worn the khaki and blue of their country and fought on land and sea in the World War to sustain our liberties. This is a deplorable situation, and all will agree that every effort possible should be made to remedy it. In the construction of great dams, canals, and drainage ditches for the reclamation of our unused lands, and in the building of farm homes on the lands reclaimed, employment could be given to thousands of deserving citizens.

Not only that, but the development of reclamation projects stimulates all industries which provide the various needs of the people. Towns and cities will spring up where all was waste before, and many opportunities for ex-service men in every line of business will develop.

They do not all need to engage in farming under this program. For instance, a short time ago I stopped overnight at a hotel in El Centro, in the Imperial Valley, Calif, where I was told that if the ocean was let into the valley (which is below the level of the sea) the sea would stand at the seventh story of the building. The town is not more than 15 years of age and yet it has from 10,000 to 15,000 inhabitants, this entire development having been brought about by the reclamation of the desert. And so you will find throughout the West these living monuments showing the effect of reclamation of previously unproductive lands, which towns, though not directly built by those engaged in farming, are the result of the farming industry brought about by reclamation.

Some people have questioned the constitutional right of the United States to purchase and reclaim waste lands now in private ownership for the benefit of our soldiers and sailors, as is proposed by the Secretary's plan. These people overlook the fact, however, that the principal thought back of this plan is to assist in a solution of problems growing out of the World War, and that it looks only to the public good of the country at large. The difficulties with which we are confronted in providing for the soldiers are not new. They were present following the wars of Caesar and of Napoleon, and other great wars. The question always arises as to how to restore normal conditions so as to furnish the people some occupation after their return from the war that will insure their contentment. It was presented at the close of the Civil War, and was solved at that time by enactment of the homestead laws, which were at first thought to be of very doubtful constitutionality. President Johnson vetoed the first bill, asserting that it discriminated against the people in the cities and towns in favor of those who desired to go to the western Territories and secure free homes. At one time the national banking act was thought unconstitutional, but no one questions the principles of that act now. The constitutionality of the pension act was at one time assailed, but that question was long ago laid at rest. It may be remarked here, that pensioning of a soldier does not necessarily consist of payment of a stated number of dollars quarterly to an individual; it might consist of preferences, credits, and opportunities to secure self-owned homes.

The Constitution is necessarily flexible; in one sense it has a soul, or what we term its reason and spirit. It may put off old clothes and put on new ones, while the reason and spirit continue the same. We must

apply new conditions as they arise in such manner as to bring them within the reason and spirit of the Constitution and the purpose for which it was framed and adopted. The Constitution, like our Nation itself, is a matter of growth. As new conditions develop—conditions that were never dreamed of in the days when the Constitution was adopted—they are met and made to come within the reason, spirit, and purpose for which the Constitution was framed and thus prove to be constitutional. That is the experience of this country and will continue to be its experience, and unless such were the case our Federal Constitution would be an impediment to the progress of the Republic rather than a protection to it.

If any of you wish to investigate this constitutional question, I suggest the reading of the discussions before the Committee on Irrigation of Arid Lands in the Senate on bill 1922, Sixty-fourth Congress, which was introduced by Senator Wesley Jones, of Washington, for the purpose of having the Government guarantee the interest on irrigation district bonds. You may procure the printed hearings by writing any member of Congress, giving the number of the bill.

I have referred to the homestead acts following the Civil War, and you may wonder why these are not now sufficient. My answer is that the public domain, which seemed almost limitless in the sixties, is now practically exhausted. Roughly speaking, there is at present no public land that can be used for successful agriculture, without being first reclaimed. This necessitates the invasion of other territory of unused and uncultivated lands owned by individuals, corporations and States. When I say "invasion" I mean a peaceful invasion, in which we shall be armed only with the ammunition of finance and machinery with which to perform this work.

England has spent in Ireland alone since 1890 more than \$500,000,000 in the interest of developing farming. This was following the example of Denmark, one of the pioneer nations in this field. The soil of Connecticut is as fertile as the sand dunes of Denmark, yet in the last 60 years 800,000 acres of Connecticut land have gone out of cultivation, while in the same time over 1,000,000 acres have been added to the cultivated area of Denmark. In Connecticut rural life is unorganized; in Denmark rural development had the benefit of State aid and direction and of organized community life. Cooperative slaughterhouses, cooperative egg-shipping agencies, and a system of vocational training unsurpassed anywhere help to explain why rural life in the foreign country has advanced while in the home State it has declined.

There is a movement on foot, and it has been acted upon in many States, for cooperation in the work of planned rural community development between the respective States and our National Government. For example, in California there has been an experiment going on under the direction of Dr. Elwood Mead, who previously had had several years' experience in

that line in Australia, where he represented that Government, in the way of furnishing men with money and credit, with which to reclaim lands and build homes, giving them ample time in which to repay. Thus far several thousand acres have been experimentally reclaimed in this manner at Durham, Calif., under Dr. Mead's supervision, with the utmost success. Many of the States have enacted laws which will enable them to cooperate along these lines with the Government in its reclamation work.

Of course we do not expect that all this vast unpeopled area will be transferred into productive agricultural lands at one stroke, or that all can be reclaimed under the Lane settlement bill; it will doubtless require supplemental legislation and years of time to bring this about. But under the proposed legislation we will be able to keep pace with the rapid increase of population of the country, with the result that eventually not only all abandoned and neglected farming districts will resume their former standards as such, but will be accompanied by the conversion into successful farms of practically all the vast areas heretofore regarded as waste territory.

I have been talking about the reclamation of waste land into productive farms and patriotic homes. I would add a word now on the reclamation into good citizenship of the great body of illiterate adults who form so big a part of our population. This question has been forcibly brought to the fore by Secretary Lane in presenting what is generally known as his Americanization plan. The term "Americanization" has been defined as follows:

Americanization in general is a matter of expressing American ideals in our daily life. It is not so much a question of knowing about America or Americanisms, but it is doing, it is realizing that which we believe to be the highest and the best in America. Knowledge of a common language is fundamental in Americanization, but our real task is to direct the use of that language in terms of constructive thought and action. We learn things by imitation and example; we learn them by means of trial and error; and our foreign-born friend is not an exception to this general rule in acquiring his Americanisms. He will learn and live an American life, following the example of American born.

Our recent World War has given to the world, and especially to this country, many new and progressive ideas. Among them is the necessity for the Americanization plan, which Secretary Lane is actively having brought to the attention of Congress through a bill introduced in the Senate by Hon. Hoke Smith, of Georgia. The Army draft brought a great surprise as to the extent of illiteracy existing throughout the United States. In the draft of the first 2,000,000 men it was found that over 200,000 of them could not read or write, and a large percentage of the drafted men, even among those who were not illiterate, could not understand the English language well enough to know what they were called upon to do by their officers. The Secretary of War, in a report to the Committee



on Military Affairs of the House, dated May 22, 1919, says: "Of the men inducted into the Army under the selective-service act, it is estimated that 24.9 per cent were unable to read and understand a newspaper or write a letter home." We know not what would have appeared had there been another draft, but to think that we had probably a million and a quarter of able-bodied men who could not read or write, subject to be called upon to go to foreign lands and to fight for this country and for democratic forms of government in general, is very startling to say the least.

It is estimated that we lose in earning power alone in this country at least two billions annually by reason of this illiteracy. That appropriations should directly be made to ameliorate this condition, can not be gainsaid. We make appropriations for the removal of cotton pests, for the protection of the health of the people of the land, and for hundreds of other like philanthropic purposes; then why should we not look with equal enthusiasm to removing from the homes of hundreds of thousands, if not millions, the existing illiteracy which prevails? To do so would be to make all better and more useful citizens, and to make our country a stronger and better Nation. Secretary Lane's Americanization plan asks for appropriations by the use of which an efficient cooperation may be had between the National Government and the various States, to bring about a system of education throughout the country that will speedily reduce and finally eliminate this bane of illiteracy. The plan also comprehends the education in American speech and

thought of aliens who, while able to read and write in their native languages, can not do so in ours.

In this connection I would point out that if we should reclaim the lands about which I have been speaking, or a considerable portion of them, we would be giving an opportunity to the people who come to this country from foreign lands better to mingle with others here, and with our own people, and to learn our habits and the customs of this country. Instead of concentrating them in cities we could put many of them upon the land, where they more naturally belong. In that way they could be better brought in contact with those who know the benefits of this country, and love its institutions, to their own profit and to the profit of the country as a whole.

There is very much more, of course, that might be said upon the questions I have been briefly presenting to you to-day. I have only attempted to form an outline that would call attention to these vital needs which mean so much to our beloved land. I trust that all of you will go deeper into these programs and will be satisfied to lend your support to a campaign of education to secure their enactment into law.

Shall this country, a pioneer and leader of the democracies of the world, negligently falter in these great movements to reclaim the waste and the unfit, that its democratic institutions may remain vigorous and thrive and extend their beneficent influence to the four corners of the earth? I sincerely hope that such will not be the case.

## MILLIONS FOR MOISTURE.

### United West Indorses More Liberal Policy for National Reclamation of Arid Lands.

In response to a call by Governor D. W. Davis, of Idaho, delegates approved by the chief executives of 13 western States met in Salt Lake City, Utah, November 21-22, and perfected a permanent organization to be known as the Western States Reclamation Association.

The purpose of the association, as stated by Gov. Davis and as written in the proceedings of the conference, is to properly present to Congress and the Federal departments a broad, comprehensive, and unified plan for the development of the public domain and the utilization of the flood and waste waters of the western streams for irrigation and power under cooperative Federal and State supervision.

The response to the call was enthusiastic, 156 delegates and alternates being in attendance. In addition many prominent western citizens were present during the sessions.

Gov. Davis was made presiding officer of the conference. He told of the advantages that have accrued to the West as the result of reclamation, stating that reclamation of arid and swamp lands is no longer an experiment, but a proved system. The

records of the railroad companies for the past year show that the Twin Falls (Idaho) project, costing \$12,000,000 to reclaim, has shipped out \$42,000,000 in agricultural products, while the Yakima (Wash.) project, costing \$14,000,000, has shipped out \$54,000,000 in agricultural products.

"It would be unnecessary for me to repeat to you the wonderful benefits the people of the great western empire have enjoyed from the development of our irrigated territory," Gov. Davis asserted, "and it will be needless to repeat the vision we all have of the happy and comfortable homes for citizens of the United States which can be developed in the future if we do our work to-day along the right line.

"We have the well-being of the West as an ideal to reach at this conference. We are here representing many people, all of whom will reflect the prosperity of the States which use to their full their available agricultural land and water. And in addition we have representing us a powerful delegation of 26 Members in the upper House and more than 80 in the lower House of Congress who will welcome a unified expression on the problem of future develop-

ment if we are wise enough to present it to them. It is for us to determine what shall be the policy in these matters.

"We are not outlining an impossible idealistic plan, but a businesslike, concrete, stable idea which will hugely increase the wealth of our country and will make more nearly possible our dream of the development of foreign trade which is our natural right in the postwar period. The Orient and the Occident will want the products of the irrigated farm.

"May I say I believe that because of our lack of unity and our failure to make the best of our opportunities by scientifically and sanely suggesting legislation upon which our representatives could agree, we have been the losers by billions of dollars and have been derelict in our duty. Every thinking man in the United States is aroused to the possibilities and necessity of properly irrigating our lands by giving a use to our God-given water resources.

"They want a fixed policy and the time to meet the issue is to-day, when we have assembled for the purpose, and I am highly pleased at the determination and spirit of the personnel of this conference and know no selfish motive of individual or community will cloud the great works we have in hand.

"At the head of the Department of the Interior and in charge of its Department of Reclamation are two capable and big thinkers, Secretary Franklin K. Lane and Director A. P. Davis, the latter of whom is our honored guest today. Both of these men with rare vision have been friends of the West and of its resources.

"I am proud to subscribe to their worth, qualifications and intelligence, and pledge myself, and I think safely, the members of this conference, to assist them in gaining the appropriations speedily and in sufficient size to complete the splendid work which they and their predecessors have started.

"This conference is distinguished by its nonpolitical personnel and what plans it makes and what demands it finally reaches will be on the nonpolitical basis of purely unbiased American ideals.

"We are not here to encourage reclamation, for the public wants it, but to make it possible. We want to urge capital to come to us through Federal, State, and private sources by building a foundation of security which will make the man who invests in either bond or farm certain of his money and become a cog in the wheel of commercial advancement in the West.

"I believe that legal machinery can be set in motion which will provide a great revolving fund by which the man who makes the soil pay its dollars into the wealth fund of the country can be assisted by his Government and State, then pay back the money for some other man to gain from, and still establish himself in a comfortable home and make a competence for his later years."

Committees on credentials, resolutions, and finance were announced. Members of the two latter had been

designated by the delegations from the several States at meetings held in their capital cities, while the committee on credentials was named from the floor.

The committees on credentials, resolutions and finance follow:

*Arizona*.—S. C. Bailie, Otis J. Baughn, Sims Ely.

*California*.—P. D. Baine, W. O. Baird, C. H. Lee.

*Colorado*.—Fred D. Lucas, D. W. Aupperle, B. C. Fox.

*Idaho*.—Will H. Gibson, G. W. Swendsen, E. H. Dewey.

*Montana*.—W. W. McDowell, W. W. Woolridge, H. E. Galway.

*Nebraska*.—J. T. Whitehead, Will M. Moffat.

*Nevada*.—A. D. Drumm, J. T. Richardson, Edmund Peets.

*New Mexico*.—F. G. Tracy, E. E. Young, L. A. Gillette, Judge Eiler.

*Oregon*.—A. A. Smith, Percy A. Cupper, W. L. Boise.

*Texas*.—George R. LeBaron, Maj. Burgess, Maj. Galbraith.

*Utah*.—W. M. Roylance, R. R. Lyman, W. W. Armstrong.

*Washington*.—R. K. Tiffany, W. J. O'Connor, R. Williamson.

*Wyoming*.—P. W. Spalding, F. C. Emerson, Charles S. Hill.

The roll call of the conference showed that 156 delegates from the 13 States were present. Idaho led the list with 40 delegates, with Utah's delegation of 25 second. California has 6 delegates present; Oregon, 11; Washington, 22; Nevada, 5; Arizona, 5; New Mexico, 5; Montana, 12; Wyoming, 8; Colorado, 9; Nebraska, 5, and Texas 3.

The committee on permanent organization then submitted this report:

*Resolved*, That a permanent organization consisting of delegates from the Western States embraced in the Federal reclamation acts be organized to further Federal reclamation work; that each State have a voting power of 10 in such organization; that the plan of such organization provide for an executive committee of one member from each State, to be chosen by the delegates from that State; that the president of said organization be ex-officio members of this committee; provided, however, that each State shall have an equal voting power in the executive committee, that said committee, among its other duties as an executive body of the association, be charged with all the educational work of the organization and the carrying out of its policies.

The name of this organization shall be the Western States Reclamation Association.

Each member of the executive committee shall be a bona fide citizen of the State he shall be chosen to represent.

The vice president, in the absence of the president, shall perform the duties of the executive office.

There shall be a secretary of the association, who shall be appointed by the president, with the advice and consent of the executive committee.

The executive committee shall have the authority to appoint a treasurer and to require him to give bond.



The executive committee shall have power to formulate and determine the policies of the association when the general body is not in session, provided such action shall be taken only in open session.

No change of policy from that decided upon by the association or executive committee in regular session shall be made, except upon seven days' notice by wire to each member of the committee and to the governors of each State, setting forth the proposed change of policy.

Five members of the committee shall constitute a quorum for the transaction of business.

Meetings of the executive committee shall be held only in the city of Washington or the city of Salt Lake, or at the time or place where the association may be in session.

The president and vice president shall be elected by the association, and all officers and delegates shall hold office for one year, or until their successors are elected and qualified.

The membership of this association shall consist of not to exceed 50 delegates appointed by the governor of each State, provided that whenever the number of delegates in attendance from any State shall be less than 10 the delegates present shall have authority to elect from bona fide citizens of that State enough additional delegates to bring the number up to 10.

The president and vice president of this conference shall be the first president and vice president, respectively, of this association.

The executive committee shall meet upon the call of the president and may adjourn or recess in any time to time. No proxies shall be allowed in any meeting either of the association or the executive committee.

The executive committee shall have authority to raise and disburse funds, but shall incur no obligation upon behalf of this association unless the funds are in hand to meet the obligation.

The president and other members of the executive committee shall receive their actual traveling expenses from the fund of the association when engaged in the business of the association.

The executive committee shall have authority to formulate rules and policies governing such expenses and regulating the business of the association and the procedure of the committee.

The report was adopted unanimously. Then, after the conference had defeated a motion by Willie of Utah that the proceedings of the conference be printed in pamphlet form, the conference adjourned until 10 o'clock, November 22.

The report of the committee on finance follows:

Your committee respectfully reports that it seems advisable to raise funds in the amount of \$40,000 to defray the necessary expenses of this association in carrying forward the work recommended and outlined at this meeting.

It is deemed equitable that the States represented provide funds for the use of this association in the following amounts: "California, \$4,000; Idaho, \$4,000; Montana, \$4,000; Texas, \$4,000; Utah, \$4,000; Washington, \$4,000; Colorado, \$3,000; Nevada, \$3,000; Oregon, \$3,000; Arizona, \$2,000; New Mexico, \$2,000; Wyoming, \$2,000; Nebraska, \$1,000."

A number of the resolutions indorsed by the conference follow:

Whereas the development of the West and the agricultural need of the Nation require the completion of

certain projects which have been started under the provisions of the reclamation acts, and which, for lack of funds, can not be completed at an early date so as to produce agricultural crops; and

Whereas a number of the projects are feasible and practicable under the reclamation acts and are needed for crop production; and

Whereas it is the sense of this conference that the interests of the entire country imperatively require funds for such work be provided, to insure the ultimate completion within a reasonable length of time of the feasible reclamation projects in the arid and semiarid Western States: Now, therefore, be it

*Resolved*, That Congress be requested to at an early date appropriate a sum of \$250,000,000 or more for expenditure under the reclamation law as promptly as such moneys can be wisely expended.

To strengthen the Union and as sound national policy, Lincoln fostered the building of the pioneer transcontinental railroads as posts or military lines, with generous land grants and the loan of national credit.

The reclamation of the remaining 17,000,000 acres of feasible irrigable land of the arid West is equivalent to the conquest of an empire and is as fitting a subject of national concern as the building of the transcontinental railroads or the purchase of Louisiana or Alaska.

It is now the part of statesmanship to stimulate growth of population and speedy increase of production in this region, to the end that, should the occasion arise, a defending Navy and a supporting Army may be fed on supplies immediately at hand, and that the railways, unhampered, may move men, materials, and munitions. As the Navy is our first line of defense on the Pacific, the people and developed resources of the mountain States and the Pacific slope must serve as the second line.

National funds advanced for reclamation to support an increasing western population would be wise economic preparedness.

Thus national safety would be fortified and peace fostered, the Nation enriched by the addition of productive areas now arid and by their annual bounty, and the gates of agricultural opportunity, now narrowing by the passing of the arable public domain, would again swing open and put an end to discontent and discouragement.

*Resolved*, That the governor of each State embraced in the association be requested to recognize the State organization of the American Legion in their respective States in providing representation of the American Legion among the delegates of each State to this association.

*Resolved*, That in the construction of all reclamation projects and in the settlement of lands thereunder preference be given to ex-service men and women of the recent war.

*Resolved*, That the executive committee of this organization be directed to confer with and cooperate with similar organizations throughout the Union interested in problems of reclamation.

Following is an account of the addresses by Director Davis and Statistician Blanchard, given Friday evening in Assembly Hall, taken from the Salt Lake Evening Herald:

No finer tribute to the pioneers of Utah was ever paid than that of Arthur P. Davis, director of the United States Reclamation Service, in a talk at Assembly Hall last night. He said that it was entirely fitting that the irrigation congress, now in ses-

sion, should come to the home of irrigation in the United States for its deliberations and plans for co-operation in the future. C. J. Blanchard, statistician of the Reclamation Service, gave an illustrated lecture on the work of the department.

Mr. Davis emphasized the importance of the reclamation of the West. He said nearly 3,000,000 acres of land have been reclaimed or are being reclaimed under the water developed and made available by the service. There are 400,000 inhabitants on the reclaimed lands, constituting the most progressive part of western United States. The cost of the projects he estimated at \$118,000,000. The gross products of the soil, due altogether to irrigation, were given as \$250,000,000. In fact he cited various instances, the Salt River Valley project in particular, which has more than paid for itself with the 1919 crop.

Mr. Blanchard went further into these figures and said that after a careful survey he found that the estimated increase of land values because of the reclamation projects was \$500,000,000.

A brief history of the service was made by Mr. Davis, in which he showed the development of the various tracts of land made productive by scientific use of water. He showed something of the disadvantages of irrigation, chief of which is the need for drainage, but ended up with the advantages and good that the Reclamation Service has done. He explained that the department is not operated for profit, that wherever possible the farmer is helped at the beginning so that he may become a producer. Where money or aid is given him the farmer is required to repay the Government, usually on long, easy terms, as long as 20 years.

Mr. Blanchard's stereopticon and moving picture lecture was a classic. He has a collection of views and pictures taken in all parts of the West, constituting a picture history of the development of the western arid desert into the immense farm land tracts of to-day. He explained that it was impossible in one lecture to include pictures of all the projects, so he hoped the audience would not feel offended if any individual project was slighted.

He included many interesting views of Utah's Strawberry Valley project in Utah County. His pictures traced the water under the Wasatch Mountains through a tunnel and showed the western slope of the mountains, where the water was made available to materially increase the value of the State.

The still pictures were beautifully colored and included most of the larger dams and canals of the Reclamation Service. In his motion pictures, taken recently, Mr. Blanchard was able to produce splendid effects by showing graphically the part that water has played in reclaiming the former arid wastes of the western domain.

A splendid spirit is evident at the present irrigation congress now being held in Salt Lake, Mr. Blanchard said. He was pleased to see that old

differences between western settlers and the Reclamation Service were forgotten and that on a big scale the men of the 14 Western States have seen fit to cooperate for their mutual advantage. He mentioned several instances where litigation was holding back the development of water rights at the present time. He said that with few exceptions the service has had the full support of the settlers and hoped for the same spirit in the future.

Stating emphatically that figures intending to show that pioneers on western lands do not stay on the lands are gross falsehood, Mr. Blanchard stated that after a careful survey of the settlers on five Government projects, it was found that three settlers make two farmers. Some reports have gone out, he explained, which tended to show that only one out of three pioneers stay on the lands.

Much good will come of the present conference was the prediction of both speakers, who commended highly the purposes and intentions of the men back of the present movement for the cooperation of all interested in irrigation.

### EFFICIENCY OF RECLAMATION SERVICE RECOGNIZED.

The Cody (Wyo.) Business Men's Association, at its regular meeting on December 1, 1919, adopted resolutions indorsing legislation providing for a substantial increase of the reclamation fund and urging the immediate construction and development of the Oregon Basin project. Embodied in the resolution are the following comments regarding the Reclamation Service:

"The United States Reclamation Service has proven itself to be one of the most efficient branches of the Government service and has developed a very capable organization for the construction and management of irrigation projects.

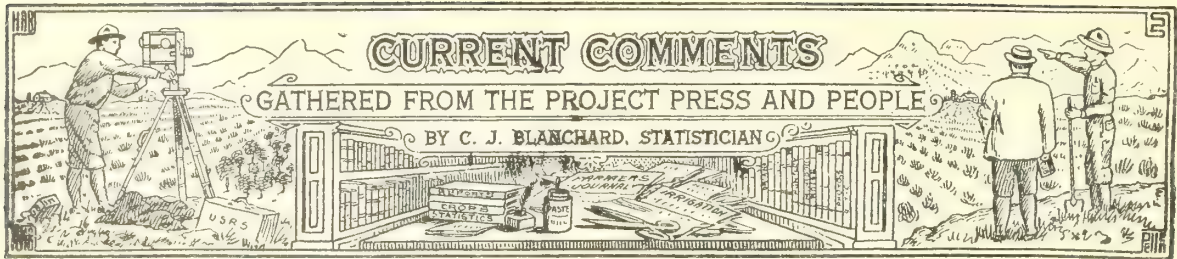
"The Reclamation Service affords the best and practically the only means of supplying the demand for good farming lands.

"One of the greatest undeveloped resources of the Western States lies in the agricultural lands susceptible of irrigation. The Reclamation Service if supplied with necessary funds affords the best available means of bringing these lands into production and thereby affording the much needed increase in the supply of food products."

Mr. W. M. Woolridge, of Hinsdale, Mont., has sent an extremely interesting and illuminating report to the Commercial Club of that city on the proceedings at the irrigation congress in Salt Lake City, November 21 and 22, to which he was a delegate. His report contains the following complimentary reference to the Reclamation Service:

"The Reclamation Service has, through years of honest effort, built up what might justly be termed a 100 per cent reputation."





Elsewhere in the RECORD we have reported the conference of delegates from the 14 Western States held in Salt Lake City, November 21-22. It was our pleasant privilege to be in attendance and to meet again many of the westerners who have been identified for years with all the big development movements of that section.

On Monday, November 23, in company with the big Idaho delegation we landed in the prosperous and enterprising city of Idaho Falls. Representative citizens escorted us to a huge convention hall in which were gathered more than 1,000 delegates representing every private, community, Carey Act, and Federal irrigation project in the Snake River Valley. It was the biggest, most enthusiastic, and thoroughly representative body of irrigators ever assembled in the State. The meeting was opened by an address from Governor Davis, who clearly set forth the purpose of the assembly as a get-together party for the purpose of making a joint plan to utilize fully and wisely the entire discharge of Snake River. He discussed briefly the various projects which are under consideration and promised the support of the State authorities in the furtherance of all worthy plans for reclamation.

Following the governor, Warren Swendsen, Commissioner of Reclamation and the prime mover in the big meeting, gave a very interesting description of the Snake River Valley and drew a pleasing picture of its development when the present wastage of water is ended. He said it was the policy of the Reclamation Service and the State to invite private capital to launch these projects. The sanction and authority and also the feasibility of the undertaking must be obtained from the Reclamation Service.

Mr. Swendsen said that the promoters of the Bruneau project had laid their plans before him when he first took office. He found that the water supply was ample, so he sanctioned the undertaking.

T. S. Richards, representing the Bruneau tract, said that the O. S. L. had promised a railroad to the project the moment work was started. He said the purpose of the administration was to get cooperation from the Government.

Director A. P. Davis spoke about as follows:

"The Federal reclamation acts were passed in 1902 for the development of the West. Two million seven hundred and eighty thousand acres of land have already been reclaimed by the Government, including

land served under Warren Act contracts. The Government has an organization of 17 years' standing that the people have confidence in and it proffers its services. An example of efficiency is the Minidoka project, consisting of 120,000 acres. On that project is the biggest electrically operated pumping plant for irrigation in the world. Lands joining Minidoka project with the Minidoka extension are considered as unfinished projects to be put in next. The American Falls reservoir should be a partnership between the Federal Government and all the irrigation systems in the valley benefited by it. We are unable to do much for lack of funds, but aim to complete the Minidoka project at least. Plans by the Reclamation Service are before the officials of the Minidoka project and at Denver, and we have all records necessary. The American Falls reservoir is too low to serve the Dubois project and North Fork or South Fork of Snake River. Jackson Lake is entirely allotted and will have to be used in connection with American Falls in serving the land above the latter and exchanging water rights. This exchange will be an advantage to the Minidoka-Twin Falls tracts in that it is so near these tracts that water may be turned down at short notice. Lake Walcott, at the upper end of the Minidoka project, is now serving 50,000 acres and is very valuable, being so near. If all steps can be made relative to moving the town of American Falls and getting rights of way through the Indian reservation the job will be lightened."

Mr. Davis, using the North Platte project as an example, explained how the Federal Government could construct and operate the reservoirs under what is called the Warren Act.

This reservoir now serves 130,000 acres of land in Wyoming and 500,000 in Nebraska. The chief thing of importance in this project is that the cost per acre-foot for permanent water right is \$5, which is approximately 10 per cent of the real value.

The American Falls Reservoir will eliminate any scramble for water during a hot spell, and is of more advantage to Twin Falls and Minidoka projects than the Jackson Lake. If funds can be raised for construction of the American Falls Reservoir, the United States Reclamation Service will gladly do the work providing this is the wish of the water users.

The director explained that it was not the wish or intent of the Reclamation Service to edge itself in or

to edge anyone else out of irrigation enterprises in Idaho. It was in the State to serve in any capacity which the people elected providing it could do so within the law and its funds. His address was enthusiastically received.

Shad Hodgins, of Twin Falls, in his speech favored a comprehensive development of the Snake River Valley, which must be accomplished by cooperation and will serve all the old settlers first and then the new projects.

Under the able direction of presiding officer Senator Hart the representatives of all sections were accorded a hearing and the views of all sections were fully made known. The consensus of opinion may be summed up briefly as follows:

Snake River Valley irrigators do not want a repetition of the 1919 water shortage. They are ready and willing to go to the bat to get more water. They are willing to pay for it too.

After listening to all the engineering dope they are now ready to sign up for the water they need, and indorse the scheme for developing the entire valley by means of a system of storage reservoirs including Yellowstone Lake. They recognize that crop losses this year total more than the entire cost of the reservoirs which are required to conserve the Snake River floods.

It was a rousing meeting, entirely free from acrimony or bitterness, and characterized throughout with the most friendly approbation of the activities of the Federal Reclamation Service.

From Idaho Falls we passed on to Twin Falls for a day, and while there had the honor of addressing the new Commercial Club. Thanksgiving Day we spent at Paul with a pioneer settler on the Minidoka project, a former correspondent of the old Inter-Ocean of Chicago, whom we introduced to the valley in 1904, before the railroad came, and for that matter before the regular settlers. Our protégé of whom we are measurably proud, F. H. Adams, is still a ranch owner, but has dropped the newspaper game for big business. He is the Poo Bah of Paul, operating the largest department store in the project, a big mill, cold-storage plant, etc. Our dinner was at the old home ranch of Mrs. Adams, on Snake River, and Mother Schodde presided at the table, around which she had gathered her big family of sons and daughters and a flock of frolicsome grandchildren. Two 20-pound turkeys and an 18-pound goose were in evidence, and relieved our apprehension as to a food shortage which had become somewhat grave after counting the family gathered about the board. We sure hated to leave that warm and cheerful ranch home to go forth for a long drive into the cold night to catch an east-bound train.

*Arizona—Salt River project.*—Land sales are still brisk in the Chandler district. Rivaling the sale re-

cently of the A. T. Morgaheidge ranch for \$500 an acre comes a similar sale, that of the J. W. Heffner 40, a half mile north of town, to A. G. Austin, for \$500 an acre. The Austins will make this their home place, as the ranch has a fine house, barns, and corrals.

Perhaps one reason why lands are bringing high prices in the Chandler district is due to the amount of hard cash derived from them, and while cotton is still king, it is not always that staple that produces the most revenue.

Below is the experience of Roy Wood, pioneer Chandler rancher, who has realized a small fortune this year from grains, all of the \$7,252 net profit coming from 32 acres of land. Mr. Wood can tell his story better than the writer, and this is it:

"In January I planted my 32 acres to wheat. I had been sick with the flu and had been unable to get anyone to do the farm work, so I hitched my disk to the back end of my Oldsmobile and disked in the seed. On April 17 I gave the land one good irrigation, about an acre-foot of water. In June I took off 266 sacks of wheat, for which I received \$1,500.

"I let the alfalfa come along then and in the meantime took a trip to the Grand Canyon. In August I thrashed 13,900 pounds of alfalfa seed and sold it for \$2,670. In October of this year I took off a second crop of seed—some 10,900 pounds—which is worth \$2,402. I still have 150 tons of alfalfa and wheat straw on the place, for which I have been offered \$12 a ton, but to be conservative will value it \$1,000. I still have my land left for pasture for the rest of the year, which should bring in several hundred dollars, which we will not figure in the sum total.

"Now adding up my receipts give me a total of \$7,662. My farming expense for these operations, including seed, thrashing, and water, amounts to \$410, leaving a clear profit of \$7,252."

*California—Orland Project.*—Between 400 and 500 dairymen met at Orland on November 27 for the all-day conference which was to consider conditions and problems in the dairy business, and endeavor to formulate plans looking toward the encouragement and enlargement of that industry.

Dr. H. W. Hand was the instigator and father of the meeting, and presided as chairman of the session.

Two of Orland prize animals carried off honors at the great California International Stock Show at San Francisco.

Natomas Baron Duke, the wonderful Berkshire hog recently purchased by the Anchorage Farm, which was given the grand championship at the State Fair at Sacramento in September, has again achieved first honors, and now has a world championship attached to his name.

Jewel of Tintagel, the famous Jersey cow belonging to M. Fortini, which was adjudged reserve grand champion at the Sacramento State Fair, has been given similar honor at San Francisco, and now carries the honor of reserve grand champion Jersey cow of her class of the world. The cow is still in her early youth, and her future gives promise of many added honors.

Orland made a name for herself at the big stock show, and the winning of grand prizes in two classes was an event that brought her name upon the lips of many people. Not only Orland, but the entire Sacramento Valley was in evidence at the show in a way that astonished the veteran stock raisers of the State. It was found that fancy stock centers had shifted, and that this section of the State was a close competitor for honors in every class entered at the show, and in many classes carried off the highest prizes offered. Glenn County will not suffer through the advertising effected through the stock show and from now on this county will have to be reckoned with by



breeders from other sections of the State as a competitor not to be ignored.

*Colorado—Grand Valley project.*—The total fruit crop of the Grand Valley, consisting of the Grand Junction, Clifton, Fruita, and Palisade districts, for the season of 1919 will amount to the sum of \$2,000,000.

This grand total is divided as follows: Apples, \$960,000; peaches, \$800,000; pears, \$100,000; other fruit, \$140,000.

These figures are the conservative estimates made recently by an official of the Grand Junction Fruit Growers' Association.

According to this official, the total tonnage of shipments is about the same as has prevailed for the previous two seasons, but prices are at least 25 per cent greater than prevailed during that period.

There are, at the time this is written, practically no apples remaining unpicked but there are fully 200 cars in storage ready for shipment.

There has been no trouble in securing cars lately and shipments have been expedited.

As an indication of the profits some ranchers have made this season, the following instance may be cited. A rancher last spring bought a 10-acre tract within 3 miles of Grand Junction. After the fruit association had deducted for all supplies furnished, it paid him over twice the amount he paid for the land a few short months ago.

Interesting reports as to the success of the growers of sugar beets the past season are due at this time and one of the best coming under our observation has been sent in by the weigher at the station south of the Chula Vista Orchard property.

Two years ago M. G. Hendricks, a Kansas farmer, came to this valley and bought a large part of the Chula Vista tract; he had never seen an irrigating ditch before and was a little fearful that he would fall down, but he has raised one of the best crops ever grown in this valley this year. He planted 21 acres to sugar beets and has hauled a sufficient tonnage at this time to show that he will harvest at least 20 tons to the acre.

At \$12 per ton this will give him \$240 gross per acre, and he thinks that is a pretty good showing for a green hand and the most of us will grant him his contention that his record will not be surpassed by many even of the experienced growers and irrigators.

Mr. Hendricks came from near Wichita and is now the owner of the west 80 acres of Chula Vista.

*Colorado—Uncompahgre project.*—This year's output from the ranch of B. C. Bullock, who came to the project from Michigan five years ago, is a pretty good illustration as to how he is basking in the sun of prosperity. From a field of 15 acres he harvested 3,075 sacks of potatoes, representing a value of \$6,550. Some of these potatoes turned out 255 sacks to the acre. From a 17-acre field of wheat he harvested 740 bushels, and his alfalfa fields returned to him on an average of 4 tons to the acre. And what is more his land is in better shape from the standpoint of fertility of soil than it was five years ago.

All this has been accomplished through the assistance of his son, Harry Bullock, who is rapidly developing into a most successful tiller of the soil. A few months ago Harry purchased a 20-acre tract of land near by, paying therefor the sum of \$3,300. His potato crop from the land this year brought him the snug sum of \$3,800, or \$500 more than he paid for the land.

Harry took a six months' course at the State agricultural college a year or so ago and he has been

putting the knowledge he secured at that time to good advantage in his farming operations. For instance, he has adopted a complete system of book-keeping until he knows just exactly what his potatoes cost him during the past season. From a field which turned out a little less than 200 sacks to the acre the spuds cost him to grow complete, including sacks, interest on the investment, and taxes, the sum of 74.9 cents per hundred pounds. On his field which produced 250 sacks to the acre the cost per hundred will be brought down to something like 60 cents the hundred.

"The trouble with most farmers in the Uncompahgre Valley," says Mr. Bullock, "is the fact that they attempt to farm too much land to farm it right. I am convinced after my experience in the past five years that 40 acres is all that one man ought to attempt to handle, and if he handles that much in the way that it should be handled he will be surprised at the results he attains and at the growth of his bank account."

*Idaho—Boise project.*—Fred A. Robinson, Max Splutters, and W. J. Robinson, of Nampa, shipped a carload of 1,608 cases of comb honey through the Idaho-Oregon Beekeepers's Association, obtaining in return therefor \$10,216.

The honey brought what is considered to be top prices, \$6.50, \$6.25, and \$6.

Those making up the shipment and the quantities supplied by each are as follows: Fred A. Robinson, 920 cases; Max Splutters, 638 cases, and W. J. Robinson, 50 cases.

One of the largest ranch deals consummated this fall was the sale of the I. X. L. ranch, owned by P. A. Sorenson, to Mr. LaRue, of St. Anthony, for \$50,000.

This is considered one of the finest improved ranches in the Boise Valley. It consists of 240 acres and has been leased for several years; Mr. Sorenson living in Los Angeles. Recently he returned to Boise, and through the Edward Stein Co., sold the ranch.

Mr. LaRue has recently sold a ranch near St. Anthony, and was ready to reinvest. He will take possession the middle of January.

Alfred H. Wilke, proprietor of "Wilketton," the poultry farm 4 miles from Boise, where White Rocks are raised, has a new pullet named Lady Mary Albreida Wilkes, which he says has established the unofficial record of 352 eggs in one year. This remarkable bird, with an average of almost an egg a day for the whole 12 months ending October 20 of this year, laid two eggs a day on three different days.

Mr. Wilke is also the owner and breeder of the famous Lady Hazelnut, producer of 308 eggs at the official international laying competition. Lady Hazelnut also has a record of 517 eggs in two years.

*Idaho—Minidoka project.*—Project Manager Barry Dibble was in Salt Lake and Idaho Falls at irrigation conventions loaded with facts and figures to show what the Minidoka project has accomplished as an incentive for the opening of more Government projects.

His data show that in 1904 the land was an uninhabited desert, containing sagebrush and rabbits. It shows that 15 years later, in 1919, the project contains 2,208 farms, 6 towns, 17,000 people, 121,000 acres of irrigated land with a crop value of \$6,000,000 for the year, 28 public schools, 11 banks with deposits of over \$4,000,000 and 11,100 depositors, and the cost of the project was only \$5,800,000.

His report shows that annually 3,500 cars of alfalfa are shipped from the project, 1,200 cars of potatoes,

450 of cattle, 350 of wheat, 220 of sugar, 210 of sheep, 170 of flour, and 150 cars of miscellaneous things.

His report shows that the storage reservoir at Jackson Lake is the fifth largest in the world; that it supplies more land and produces more crops than any other in the world.

After many delays, due to the slowness of machinery arriving, the Rupert cheese factory opened its doors for business last month in the building formerly occupied by the old creamery. Over 1,500 pounds of milk were brought in, the storm keeping some of the farmers at home.

This factory will be run on a cooperative system, with G. C. Breazeal heading the organization.

Burley is soon to have the most modern and up-to-date ice plant in the State. Otto Stuelpnagel, S. C. and G. N. Bever, of Pocatello, are the gentlemen who will erect the plant. These gentlemen have bought four lots just east of the Farmers' Equity Elevator, where they will erect a building costing \$50,000. Machinery for the plant has already been ordered and some is on the way here. The plant will have a capacity of 33 tons per day and the company will wholesale and retail ice. They expect to have it in operation by the 1st of February.

Governor Davis, of Idaho, while in Salt Lake City recently, said:

"Efforts on the part of the West to obtain an appropriation from easterners has always brought out the cry of 'pork barrel.' Had easterners driven with me November 1 from Burley to Twin Falls in Idaho and had the easterners been Members of Congress, they would have voted for any irrigation scheme that could be presented for the country over which they would have passed.

*Montana—Flathead (Indian) project.*—At the Mission Valley fair, held recently at Ronan, Mr. T. L. Lee, of Ronan, received the first prize for the largest variety of exhibits from one farm. Among the 55 products shown by Mr. Lee were some sheaves of alfalfa. He stated that from a measured 4 acres of alfalfa he had cut 26½ tons of hay this summer in three cuttings. Next year he will have 40 acres of alfalfa.

Mr. Lee is an authority on alfalfa in his vicinity, having grown it for a number of years. He seeds it at the rate of 20 pounds of seed to the acre, and considers this one of the reasons for his success.

A number of the Mission Valley breeders of purebred Jersey cattle have formed the first local Jersey Breeders' Association. The new organization has purchased a registered sire of the famous Logan strain from the Bitter Root Valley.

The members of this, the pioneer breeders' association in the valley, are G. W. Kerns, Charles Becker, Michael Jaten, E. W. Gould, and S. R. Logan. Mr. Gould was elected president and Mr. Kerns secretary.

If this organization is successful further associations will soon be formed in many parts of the valley.

*Montana—Milk River project.*—Probably one of the most harmonious get-together meetings ever held in northern Montana was when the commercial club secretaries and members of the various business organizations met at the commercial club rooms at Glasgow on Saturday evening, November 22, for the purpose of discussing the possibility of organizing an association to boost the resources and opportunities that exist in the Milk River and lower Missouri val-

leys. It was the unanimous opinion of all present that an organization be perfected and be put in operation by January 1, 1920.

After the discussion of the several features by which publicity could be accomplished, irrigation and better roads, together with the possibilities of raising sugar beets and developing the dairy and forage industries, a special committee, consisting of A. S. Lohman, C. R. Hauke, Chinook; R. V. Bottomley, Harlem; O. P. Shenefelt, Malta; R. M. Connor, Poplar, and Arlie M. Foor, Wolf Point; was appointed to draw up the constitution of the organization.

James Rannel has just completed threshing his crop of alfalfa seed which is probably the largest crop of this kind ever threshed in the Milk River Valley. As a result he has 900 bushels of choice seed. Of this amount there are 700 bushels of Grimm seed and 200 bushels of the common.

Mr. Rannel has already contracted his entire crop of Grimm seed to A. B. Lyman at 35 cents per pound. That is at the rate of \$21 per bushel. His crop of Grimm seed will bring him about \$14,000 and in addition to that he will have 200 bushels of choice seed. Of this alfalfa straw which is selling from \$10 to \$15 per ton. He will probably have about 200 tons of this straw to sell. It makes excellent feed for wintering cattle or horses.

Mr. Rannel is 3 miles west of Harlem, and most of his land is now in alfalfa. He is planning on getting it all into alfalfa and expects to continue raising seed each year hereafter when the conditions are favorable.

Mr. Rannel started raising alfalfa several years ago, but it is only in the last 2 years that he has gotten his land down to where it will produce the best and he has had two very successful seed crops in succession.

Alfalfa seeds best in the dry seasons, and that is the reason why it can not be grown successfully in all parts of the country. The Milk River Valley is recognized as an ideal place to grow alfalfa seed and the dealers from all over the country have been flocking here lately to buy up the available supply.

With the coming of irrigation in the valley there is a great future for those who will engage in growing alfalfa for seed.

Figuring the returns from the land at 10 per cent on the investment, the irrigated lands of the famous Milk River Valley are worth \$900 to \$1,000 per acre. These figures have just been revealed by two prominent farmers, who raise alfalfa, in their annual report to the Reclamation Service, which is taking a census of the products grown under reclaimed lands under the Milk River project.

Thomas M. Everett, who has a field of 200 acres of alfalfa, reports that this year his crop went 4 tons to the acre for hay and that he has sold the whole crop in the stack for \$23 per ton, bringing him \$18,400, or an average of \$92 per acre.

James Rannel, who had in 200 acres of alfalfa, let his crop go to seed. From this crop he thrashed 700 bushels of Grimm alfalfa seed, which he sold for \$21 per bushel; 200 bushels of common seed, which he sold for \$10 per bushel; and he has left 300 tons of alfalfa straw, which he is selling at \$15 per ton. His total income will be \$21,200, or an average of \$106 per acre.

Every foot of the Milk River Valley which is properly farmed can be made to produce in a similar manner when the land is brought under irrigation, and a movement has been started by the Harlem Development Association to push all irrigation projects so



that the whole Chinook unit of the Milk River irrigation project can be brought under water.

With the St. Mary's water supply now turned into the Milk River, the Milk River project has the best and most stable water right in the State of Montana. The drouth of the past season gave it the severest possible test. The source of water for most every other irrigation project in the State dried up during the season when water was most needed, but there never was a shortage of water for irrigation purposes in the Milk River. As a result, the irrigated lands of the Milk River Valley have produced the greatest crops in years.

According to the movement which has been started an irrigation district will be created on the north side of Milk River this winter which will water all the land between Lohman and Harlem, and the people east of Harlem are proposing to have the Harlem ditch extended clear down to Coburg, which will add about 10,000 acres.

The Harlem Water-Users' Association purchased a large dredge last summer, which has been working continuously and is still in operation enlarging their main canal. New stockholders have been taken into the company, increasing the capital to \$160,000, and next summer it is expected to water 3,000 acres more than last year.

There has been a great deal of activity in the valley this fall in building new lateral ditches and improving the old ones. The cold weather coming on earlier than was expected stopped a great deal of this improvement work. Several farmers who have come under the irrigation project are planning on installing large centrifugal pumps for pumping water on their high ground so as to get all their land under production. It is estimated that at least 50 per cent more land will be under water next spring in and around Harlem.

*Nebraska-Wyoming—North Platte project.*—A square mile isn't such a large piece of ground. In fact there are 600 of them in the distance covered from Bridgeport west, placing the average width of the valley at 10 miles, that is, of course, the irrigated portion.

Yet every one of those 600 square miles in the territory cited earned \$6,114.59, which was paid out at the three factories of the Great Western Sugar Co., recently; that is to say that if the \$3,668,759.04 paid to the farmers of this valley yesterday were distributed over the territory equally, that is what the result would be.

It is slight wonder that the valley is prosperous when within the limited territory will be distributed practically \$6,000,000 for this season's beet crop. The exact figures of the sums paid the farmers at the three factories, as furnished by the officials of the company, are as follows:

Scottsbluff factory	\$1,706,621.89
Gering factory	1,186,891.02
Bayard factory	775,246.13
Total for valley	3,668,759.04
Belle Fourche	81,403.12
Grand total	3,750,162.16

The Belle Fourche payments are made from the Bayard factory, as the beets from the South Dakota district are shipped to that institution.

There are, this season, 52,142 actual-measured acres of beets grown in this district, which, with the total given above, makes an average first payment to the farmers of \$70.36 per acre. If the estimate of \$6,

000,000 is taken as approximately correct for the entire season, it would leave some \$2,331,240.96 or thereabouts to be distributed at the next and final pay day to the farmers. This means another payment based on the measured acreage of \$44.70 for the remaining beets in ground and silo, or a total average of \$115.06 per acre, taking of course the total payment and the total acreage for this district—practically \$10,000 per square mile for the valley, less what is paid to the Belle Fourche farmers, which is small in comparison.

To Morrill and Scotts Bluff Counties comes the honor of establishing an entirely new world's record in price paid for a Hereford bull, less than a year old, this same record being made at the John Heinz and John Burson sale of Herefords which took place at the sale pavilion at Morrill recently, and the price received for the animal being \$11,000.

The sale, which was of 10 bulls and 50 females of the intense Anxiety 4th breeding, was handicapped somewhat, so far as attendance was concerned, by the severe cold which had upset train service, one special car of buyers who were planning to be in attendance from the Cambridge country being sidetracked at Brush, and the men therefore missing the offering. What the sale may have been lacking in numbers, however, was thoroughly made up in interest and spritely bidding, Col. E. D. Snell, of Cambridge, being the auctioneer.

When Superior Domino 5th, calved on January 6, 1919, and owned by Burson, was placed in the ring, bidding started off by leaps and bounds, and when the sum of \$7,000 was reached the auctioneer held up his hand, and with a solemnity fitting the event stated that at that point the world's record for price bid for a Hereford that age had been equaled. Then bidding started again and kept steadily climbing, George Monroe, of the Morrill neighborhood, bidding \$10,500, only to be exceeded by Bob Mousel, of Cambridge, who offered an even \$11,000. He won. Mr. Mousel has a reputation of being one of the best judges of Hereford cattle in the United States, and that his bidding was based on cold logic can be determined from the fact that he once owned the father of the bull, which he sold for \$21,000. He plans to exhibit the \$11,000 calf at the International at Chicago, the Royal at Kansas City, and also at Denver.

*Nevada—Newlands project.*—The largest land deal made in the history of this county was completed this week when R. L. Douglass sold to C. W. Renfro 1,360 acres of his island ranch, all in cultivation and carrying a vested Government water right, for a sum approximating \$250,000.

Mr. Renfro is one of the most energetic farmers in the project and has figured the why and wherefores attaching to Lahontan Valley farming to a very fine point. He knows agricultural effort pays here, because he has given nearly 15 years to it.

If O. J. Vannoy and others associated with him succeed in putting through plans now in mind, Fallon's cantaloupe production, admittedly of the highest class to be found anywhere, will be multiplied many times within the next two years. It is Mr. Vannoy's aim to increase his own seasonal acreage from 8 or 10 to 30 to 50 and the demonstrations already made by him have resulted in a growing cantaloupe acreage on many project farms. Other farmers generally who have experimented with the crop and learned how it rewards effort will also increase their scope of melon-growing activities. Mr. Vannoy is the admitted pioneer in the field. He lately bought 20 acres of ground adjoining Fallon on the

east from H. F. McLane, and this will be given over exclusively to his melon-growing business.

It is generally conceded that the excellence of Fallon melons and the consequent outside demand occasioned thereby warrant a **melon growers' organization**, under which auspices standardization could be effected and the locally grown cantaloupe further popularized.

The average per acre cantaloupe production in this project is said by Mr. Vannoy to be 250 crates, and although the crop ripens here months after the Imperial Valley production has gone forward to market, the superior quality of the Newlands project melon has forced general acknowledgment that it is in a class by itself as a dietary article.

*New Mexico—Carlsbad project.*—M. N. Cunningham, who has 300 hives of bees spread out over the project, reports that he will have an estimated production of from 16,000 to 18,000 pounds for this season.

"I sell my honey by parcel post," said the bee man recently. "I have customers in seven States who like the 'Blue Ribbon' brand. Prices are now 17½ cents wholesale f. o. b. Carlsbad."

The Carlsbad project cotton gins are busy turning out the ready-money stuff these days, the gin at Otis having already passed the 750 mark, while the one at Carlsbad is rapidly making up for the lost time at the beginning of the season, when some trouble was had with the machinery of that usually reliable plant. The gins at Loving and Malaga are also busy. The crop will go well over the 5,000 bales predicted, while the price is still soaring.

*New Mexico-Texas—Rio Grande project.*—The New Mexico College of Agriculture has experimented in the past with the growing of cotton in the Mesilla Valley of New Mexico, and has shown that it can be successfully grown here.

The Mesilla Valley is now about to enter the cotton-growing business; 1,500 acres of valley lands have been contracted for to raise a cotton crop this next season.

A number of gentlemen from Arizona, where they are engaged in the growing of cotton were in Las Cruces the past week and made arrangements for this acreage. One of these parties sold land in Arizona (cotton land) for more than \$400 an acre and in turn purchased land in the Mesilla Valley at a cheaper price, which he figures will soon be worth as much as the Arizona land, once it is producing cotton.

Parties have agreed to build a gin in the Mesilla Valley if 600 acres were planted to cotton. With 1,500 acres contracted for it is expected that two gins will be built the next season.

Many people have felt that the future of the Mesilla Valley lay in the production of cotton, considering the climate, water and labor, and the right kind of soil for its production. Their dream will now be tested out.

With an ever-increasing acreage in the famous "pink meat" cantaloupe of the Mesilla Valley, with an increasing acreage in cabbage; with the great increase in the production of sweet potatoes, and with a drying kiln to care for and preserve the crop for market; with a steady stream of new blood, and farming blood, coming into the valley, the future is very bright indeed for our beautiful valley.

*North Dakota pumping project.*—On the North Dakota pumping project the Williston Irrigation District and the Williston Commercial Club are making an effort to dispose of excess farm holdings. The

chief drawbacks to the best development of the project have been the large size of the farms and the large percentage of nonresident land owners.

Some genuine bargains are now offered by the public-spirited land owners in order to split their holdings and get new farmers on the lands. Farmers with irrigation experience are especially wanted.

The Commercial Club and Williston Irrigation District, Williston, N. Dak., have legally executed options and authorities to sell. During the irrigation season 1919 more land transfers have been made than during six years preceding.

It might pay some farmers who have developed high-priced land on other projects to make a new start and another profit on North Dakota pumping project.

*Oregon—Umatilla project.*—The October shipments of the products of the Hermiston Valley have kept up well with preceding months, 139 carloads having been sent out. Hay is the predominant factor in these shipments, but this year apples are playing a prominent part in swelling the tonnage.

The incoming carload shipments are varied. There were 24 cars received here in October, among them being three filled with household goods of new settlers coming from other States.

*Washington—Yakima project.*—The entire herd of Holstein cattle of Butchart Bros. of Granger has been sold to the Toyon farms of California for approximately \$10,500. The 30 animals brought \$350 a piece, it is said. The negotiations for the sale started at the Portland International Exposition last week where Butchart cattle won several ribbons. President Miller of the Toyon farms came on to Yakima after the fair closed and purchased the entire herd, young, old, male, and female.

Butchart Bros., who have been on the H. C. Davis farm at Granger, will move to the Kelly-Williams ranch of 80 acres near Sunnyside. It is understood they will start another Holstein herd on the new place. H. C. Davis, president of the Central Bank & Trust Co., intends to run his ranch at Granger himself as a stock feeding farm, it is said. The Toyon farms last year bought the Joseph Tyson herd.

Sixty tons of apples are being handled daily by the local cannery. This is a high record, being 10 tons, or 250 cases, more than the normal output. Four-fifths of the production is canned apples, and one-fifth apple butter. The working force is now 350 men and women, the largest ever maintained at the plant. There are 130 women trimmers and 230 men employed in various capacities.

The plant is shipping its product heavily. Six cars of canned goods, chiefly early fruits and vegetables, were started on the first lap of their journey to Paris, and another section of six cars began rolling toward London within the last week. About two cars daily are now being sent to all parts of the United States.

Boxes for Yakima's 1919 apple crop, most conservatively estimated at 9,000 carloads, required as much lumber as would have been used in building 3,385 homes of average size.

One apple box, according to experts, requires 5 board feet. Assuming that there are 750 boxes to the car, the crop this year was loaded into 6,750,000 boxes. This, translated into board feet, amounts to 33,850,000 board feet. Carpenters estimate that the average home requires 10,000 board feet of lumber for its construction. By a simple mathematical process, it can readily be seen that the wood used in boxing this year's crop would have sufficed for the erection of 3,385 homes.



Statisticians say that, generally speaking, five persons are housed in each home. In this day of an acute shortage of housing facilities throughout the Nation, fully 16,800 people could have been housed in the bungalows which might have been erected from the lumber used here for apple boxes this year.

Further extension of the policy of stabilizing employment conditions has been announced by the directors of the Yakima Fruit Growers Association in the form of group life insurance covering all its employees.

Since October 11, when the directors voted on this step, every employee from the general manager down in the association's 11 warehouses and cold storage outfits in the valley, has been protected by a life insurance policy of \$1,000 each.

*Wyoming—Shoshone project.*—A large crowd of Powell business men and farmers attended the good roads meeting at Cody recently, called by the chairman, Mr. Ayers, to perfect the organization of a county good roads association. Some who were present report it the best and most profitable road meeting they ever attended. Powell representatives were honored with the chairmanship of the newly formed organization, the honor going to our project manager, Mr. Ayres, who had previously been acting in the capacity of temporary chairman.

After being delayed in their work in waiting for the arrival of material, which made it impossible to complete the plant in time for handling this year's crop, the contractors have finally turned over the keys to the owners.

This institution is another forward step in the progress of Powell, it being the first town of its size in the State to have a public storage, and but few, if any, towns of any size have a building that equals this structure in quantity of construction. Its capacity is about 100 cars in basement.—*C. J. B.*

### MY IMPRESSIONS OF OUR PROJECTS.

By Morris Bien, Assistant to the Director, U. S. R. S.

I have just returned from a two months' trip, visiting the several projects, among them the Boise, Yakima, Umatilla, Newlands, Yuma, and Rio Grande.

The conditions on the projects are without exception very satisfactory to the water users.

In nearly every case I met men who had previously been through severe difficulties in making their farms successful and they all expressed themselves as feeling that they were out of the woods and as being thoroughly satisfied regarding the conditions on the project, the water deliveries, etc.

The high prices of crops have enabled the farmers generally to get on their feet, and in fact they find themselves in many instances considerably ahead financially. The climatic conditions during the present year on our irrigation projects have generally been unusually favorable, and in nearly every instance the crops have been much greater in quantity and better in quality than the average. This, coupled with the high prices, has been conducive of a high state of good feeling among the water users.

### GOOD NEWS FROM YUMA MESA OPENING.

The following telegrams tell the story of the successful sale of Yuma Mesa land, December 10 to 12, 1919:

F. E. Weymouth, chief of construction, wired as follows:

December 11.—"Schlecht wires 175 farm units offered and all sold on first day at prices ranging from \$25 to \$125 per acre for the land."

December 12.—"Two thousand acres Yuma Mesa sold on 11th, chiefly at appraised value of land. Sale will close to-morrow at noon."

December 15.—"Auction sale first unit Mesa lands closed on 13th with about 88 per cent of area sold."

In response to a telegram from Secretary Lane, Col. B. F. Fly, of Yuma, who has been closely associated with the movement for the development of the Mesa, telegraphed on December 15 as follows:

"Cordial thanks for your telegram. Personally I regard auction sale Yuma Mesa lands tremendous success. Five thousand five hundred acres sold for over million and quarter dollars. All who purchased anxiously awaiting your telegraphic declaration the sale is success and that work will begin at earliest moment possible. Your good wishes for Yuma thoroughly appreciated."

On December 16 Project Manager Schlecht wired as follows:

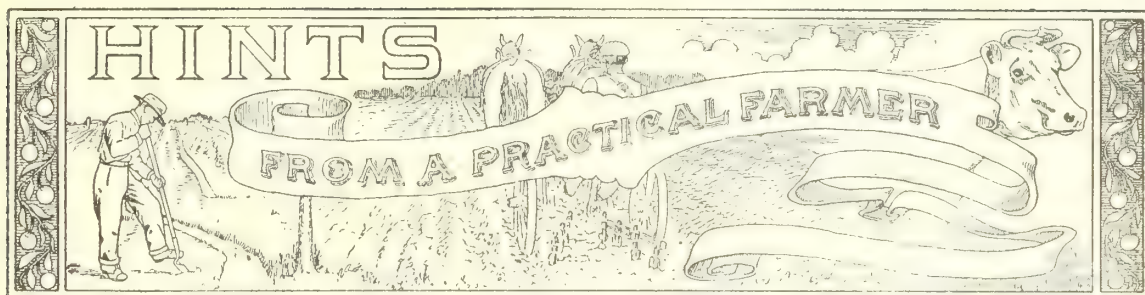
"Unique auction sale Government land held at Yuma, Ariz., on December 10 to 13, resulted in selling 5,500 acres Yuma mesa lands. In 16 hours' actual selling time over \$1,250,000 land and water rights sold. Purchasers were from all parts of the United States. Maximum price, including water right, \$355; minimum price, \$225; average price, approximately \$230 per acre."

The appraised value of the dry land has been designated by the Secretary of the Interior as \$25. To the prices bid must be added \$200 per acre, the estimated cost of the irrigation works. About 6,400 acres, comprising about 531 farms, ranging in size from 5 to 20 acres, were included in the sale.

There is no publication I receive that gives me so much information as the RECLAMATION RECORD for 50 cents.—*J. B. Marcellus, associate professor of civil engineering, University of Colorado, Boulder, Colo.*

Inclosed is 50 cents for another year's subscription to the RECLAMATION RECORD. Could not get along without it.—*William L. Goldsmith, Gering, Nebr.*

Please mail RECLAMATION RECORD to the above address. I never want to miss one number of the publication. It is simply grand. I am not a water user yet, so I inclose herewith a money order for 50 cents for a year's subscription.—*James Lexa, New Prague, Minn.*



### The Ice Harvest.

Each year dairymen lose thousands of dollars from returned sour milk, poor butter, and low-quality cheese. These losses are largely due to improper cooling of milk and cream on the farm, according to dairy specialists of the United States Department of Agriculture. For good results milk and cream should be cooled to 50° or lower and held there; and as this usually can best be done by the use of ice, dairymen should take advantage of any near-by lake or stream to obtain a supply of ice for next year.

#### ICE COSTS LITTLE.

The ice-harvesting season fortunately comes at a time when there is the least work on the farm for men and teams, and consequently the actual money cost is usually not very great.

The quantity of ice needed depends upon the location of the farm—whether in the North or in the South, the number of cows milked, and the method of handling the product. In the Northern States it has been found that, with a moderately good ice house, one-half of a ton of ice per cow is sufficient to cool cream and hold it at a low temperature for delivery two or three times a week. One and one-half or two tons per cow should be provided where milk is to be cooled.

#### CAPACITY OF ICE HOUSES.

A cubic foot of ice weighs about 57 pounds, so in storing ice it is customary to allow from 40 to 50 cubic feet per ton for the mass of ice. At least 12 inches must be left between the ice and the wall of the building for insulation, unless the ice house has permanently insulated walls and an unusually large space for insulation beneath and above the ice. From these figures it is possible to calculate readily the quantity of ice that any given ice house will hold.

Water for the ice supply should be entirely free from contamination or pollution. Ponds and sluggish streams usually have grass and weeds growing in them, so that the ice harvested is likely to contain decayed vegetable matter, which is always objectionable. They should therefore be thoroughly cleared of such growths before the ice has formed.

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In some sections it is necessary to impound the water for producing ice. This may be done either by excavating, and diverting a stream into the excavation, or by constructing dams across low areas. In localities where very low temperatures prevail for several weeks at a time, and the supply of pure water is limited, blocks of ice may be frozen in metal cans or in special fibre containers.

#### SIZE OF THE ICE FIELD.

In harvesting ice it is desirable to have a field of sufficient size to fill the ice house at a single cutting, as the thickness and quality of the ice will be more nearly uniform, and the necessary preparation for cutting and harvesting need be made but once. In many instances, however, the size of the pond or stream is such that it is necessary to wait for a second crop in order to fill the ice house. The average farmer requires only a comparatively small quantity of ice, so that even a small harvesting surface will usually prove large enough, especially if ice is cut the second time. The square feet of surface required per ton when the ice is of different thicknesses is shown in the accompanying table. Size of cake, 22 by 22 inches.

*Square feet of ice surface required per ton of ice.*

Thickness of ice.	Number of cakes required per ton.	Cutting space required per ton
<i>Inches.</i>		<i>Square feet</i>
4	31.3	105.4
6	20.9	70.2
8	15.6	52.6
10	12.5	42.1
12	10.4	35.1
14	8.9	30.1
16	7.8	26.3
18	6.9	23.4
20	6.3	21.1
22	5.7	19.1

#### FEW TOOLS REQUIRED.

When a small quantity of ice is to be harvested few tools are required. The following list contains those actually needed for harvesting ice on a small scale: Two ice saws, one hand marker, one pulley



and rope, two pairs of ice tongs, two ice hooks, one pointed bar, and one straightedge. Although these tools are all that are necessary, additional ones, such as the horse plow and marker, horse scraper and marker, and a calking bar, are convenient, and will help to expedite the work of ice harvesting.

### Depending on One's Self.

The American Swineherd gives the following sound advice which is just as applicable to other affairs of life as it is to raising hogs:

"The hog man who looks to another to guide him in each and all matters as a breeder and feeder will never rise to fill the original independent position of a genuine breeder.

"It is all right to seek all of the points and instruction that you can from the experienced, successful breeder and feeder, but if you stop there you will have each time to ask instruction before you make a move, which is a weak method of educating and appropriating the knowledge that you get from others.

"It requires earnest thought and sound reasoning upon all matters to comprehend thoroughly and acquire the knowledge as your own.

"It is to the advantage of the man to seek the benefit of the experience of others, as he is saved their cost of obtaining it thereby, but he should appropriate it, digest it, and look to the reasons for it and thus make it his own. And this is one of the roads to success in all business, and the hog business, either as a feeder or breeder, is no exception."

### More Hogs Needed in Arizona.

Approximately 200,000 carcasses of pork are required each year to supply the needs of the people in Arizona according to Dr. R. H. Williams, animal husbandman, college of agriculture of the University of Arizona. "It is doubtful," he states, "if there are more than 30,000 hogs in the State at the present time, so that the home supply of pork products amounts to approximately one-fifth of the actual demands.

"A packing plant is nearing completion at Phoenix, Ariz., where they plan to handle many more than the total number of hogs produced in the State. Believing that the number of hogs will be increased, since Arizona has such favorable conditions for hog raising, the packers feel that it is a safe proposition to invest money on a plant for slaughtering hogs and curing their products. This should be such good assurance to stockmen that they will be willing to raise more hogs.

"Successful hog raising demands the use of a large amount of concentrated foods such as grains. In the past the tendency to raise more cotton and less barley and the grain sorghums has operated

against increasing hogs in the State. It is believed that a more diversified system of farming must be installed and certainly hogs will play a more or less prominent part in the new system of diversified farming. One of the greatest advantages to be secured from hog raising lies in the fact that they will consume many by-products of the farm which would be of little value otherwise. Grain screenings, waste products from fruits and vegetables, skimmed milk, buttermilk, and scattered grains after harvesting, all can be well utilized by hogs. These animals are also being extensively used for hogging down crops and utilizing them without much labor.

"If this new packing plant will sustain Kansas City prices it is believed that Arizona farmers will continue to raise hogs in larger numbers. Every farmer should have at least a few hogs, for they will add to the farm profits and to the resources of the State. The number of hogs raised in Arizona should be doubled within the next two years."

### Exterminating Rats by Poison.

In exterminating rats either by poisoning or by trapping it is important to bear in mind that success depends largely on the degree to which the removal of other foods makes the poisoned bait or the bait in the traps attractive to the rat. A variety of poisons may be used, barium carbonate, phosphorus, arsenic, and others, but, even with an efficient poison, failure often results through lack of attention to details.

#### HOW TO USE BARIUM CARBONATE.

1. *Kind of bait.*—Three or more kinds of bait should be used. Each must be mixed separately with barium carbonate. One kind of bait from each of the following classes should be used:

(a) Meat or other animal substance; such as hamburger steak, sausage, canned salmon, eggs, or oysters.

(b) Fresh fruit or vegetable food; such as cantaloupe, tomatoes, green corn, baked sweet potatoes, bananas, etc.

(c) Miscellaneous foods, milk or cheese, peanut butter, bread, cake, cereals (raw or cooked).

2. *How to mix.*—The barium carbonate must be thoroughly mixed with the bait, so that the rats can not eat the smallest portion of the bait without getting some of the barium carbonate. In the case of such substances as hamburger steak, cheese, etc., use 1 part of barium carbonate to 4 parts of bait. Mix thoroughly with a spoon.

Substances which can not be thoroughly mixed with the barium carbonate as just described (for example, cantaloupe, tomatoes, etc.) should be cut into small pieces and thoroughly covered with the barium carbonate, and then worked in with a knife.

3. *How to set poison.*—The three kinds of bait, prepared as above, should be divided into small portions,

about a teaspoonful each, and placed freely about premises, alternating baits 1, 2, 3. It should be set at short intervals, not over 10 or 15 feet. Do NOT MIX THE DIFFERENT KINDS OF BAIT WITH EACH OTHER.

4. *General instructions.*—The morning after baiting look for dead rats and remove them. Take up baits. Examine these so as to see which have attracted most rats. If any kind of bait has not been touched, use

a different bait instead of this. Fresh bait should be used each night.

5. *How often to bait.*—Bait every night, as long as rats continue to eat bait.

6. *Caution.*—Keep fowls, dogs, cats, etc., away from bait.

ANTIDOTE.—An emetic, followed by Rochelle or Epsom salts.

## COMMUNITY EFFORT ESSENTIAL IN COMBATING HOG CHOLERA.

By the Office of Information, United States Department of Agriculture.

\*One of the most important requisites for the successful establishment of the swine industry on the reclamation projects is the control of diseases affecting swine. This is particularly true with reference to hog cholera. When this disease breaks out on a project and is allowed to go unchecked the losses are frequently very high. Often where cholera occurs in a herd and the hogs are not treated as many as 90 per cent of the hogs are lost. It becomes important, therefore, that the swine growers prepare themselves, first, to prevent the disease from being brought to the project; and, second, to control it in case outbreaks occur.

### COMMUNITY ACTION NECESSARY.

One of the first things which farmers should understand in connection with the prevention and control of hog cholera is that they must work together. The disease is highly infectious and is spread by irrigation water and in other ways, so that any farmer, working by himself, is practically powerless to control it. But if a community of farmers will cooperate they can do much to prevent the disease from being brought to their locality, and if it does occur they can do very effective work in controlling it. Without community action the control of hog cholera is practically impossible.

Community action will vary somewhat with the local conditions, but in all cases all swine growers in the community should encourage and take part in whatever cooperative action appears to be desirable. This ordinarily includes the enforcement of quarantine regulations, prompt reporting of diseased animals to the proper authorities, the maintenance of a supply of antihog-cholera serum, the proper disposal of dead animals, and the cleaning up and disinfection of premises where cholera has existed.

### INSPECTION AND QUARANTINE.

Perhaps the most important point to be considered in keeping hog cholera away from a project is to make and enforce quarantine regulations to prevent the importation of diseased animals. Properly drawn quarantine regulations provide that all hogs shipped

into a quarantined area must be inspected by an authorized official, and that those shipped in for purposes other than immediate slaughter shall be immunized against hog cholera, and that when shipped into the area they shall be accompanied by a certificate of health and a certificate of vaccination. They further provide that hogs to be shipped into the area must be loaded onto disinfected cars, and from wagons rather than from stockyards; and that no hog-cholera virus shall be shipped into or used in the quarantined area.

### CAUSES OF CHOLERA.

Hog cholera is caused by a specific germ. Lice, worms, insanitary quarters, and poor feeding methods can not in themselves produce the disease, although they can so reduce the vitality of the hogs that the animals are less resistant to the germs causing the disease. These germs are given off in the feces and urine of sick hogs. They are also present in parts of carcasses of hogs which have died of cholera.

### SYMPTOMS OF CHOLERA.

Symptoms of cholera are numerous, but those named below are the most pronounced. It is only in rare instances that all the symptoms are present in any one case. Cholera usually begins in a herd by affecting one or two hogs. The first symptoms noticed are sluggishness, loss of appetite, high fever, discharge from the eyes, and either constipation or diarrhea. As the disease advances red or purple blotches may be found on the skin of the hog's belly, inside the legs, and around the ears. Frequently the affected hog coughs when he is aroused from his bed. The hog loses flesh rapidly, walks with an uncertain gait, and often is wobbly in the hind parts. An affected hog may live only a few days, or he may live for several weeks.

It is often impossible to determine positively whether a hog has cholera without a post-mortem examination. Such an examination of an affected hog may show numbers of small, red spots on the lungs, and occasionally similar red spots may be found on the heart. The spleen may be enlarged, dark, and



very soft. One of the most important indications is small, red spots on the kidneys. These are usually very pronounced. There may be only a few of them, or the kidney may have a speckled appearance resembling the shell of a turkey egg. In chronic cases, button-like ulcers may be found near the "blind gut" where the small intestine enters the large intestine. The lymphatic glands, located between the hind legs along the abdomen and also between the lower jaws, are normally a light grayish color, but in cases of cholera these glands are much enlarged and reddish in color.

It is advisable to get some one who is familiar with hog cholera lesions to hold a post mortem examination. Failure to recognize the disease when it breaks out in a herd may result in much loss which could have been prevented.

#### HOW CHOLERA IS SPREAD.

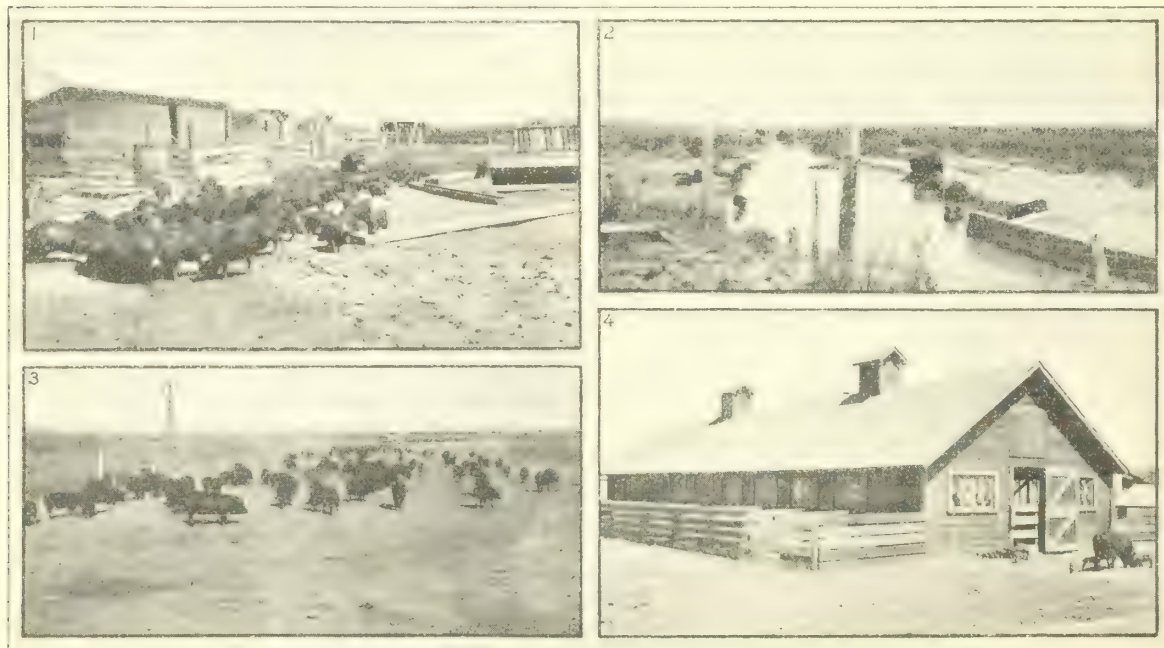
When cholera is once brought to a Reclamation project it may spread very rapidly. Perhaps the most important agent in the spread of the disease is the irrigation water. The cholera germs will get into the water if diseased hogs are allowed access to the irrigation laterals, or if hogs that have died of the disease are allowed to remain where parts of the car-

casses can be washed into the canals. Other important agents in spreading the disease are birds, dogs, and wild animals, which may visit the carcasses of diseased hogs or premises where the disease exists. The germs may also be carried on farm implements or on the feet of men and animals passing from infected farms to disease-free farms.

If hogs are kept healthy through proper feeding, the use of clean quarters, plenty of clean drinking water, and by being kept free from lice and worms, they are more able to resist the attacks of cholera germs than if their health is not good. Particular attention should be paid to lice and worms, and where they are present measures should be taken to eradicate them. The hogs should be well provided with a supply of mineral matter, such as charcoal, rock salt, rock phosphate, or wood ashes.

#### PROPER CONTROL OF CHOLERA.

If, for any reason, cholera should appear on a project, the farmers should immediately make arrangements to prevent its spread. Such arrangements should include careful handling of the hogs in the infected herds. In case of an outbreak on any farm the surrounding farmers should be immediately notified so that they may keep close watch of their own



1. An unsanitary hog yard. Such conditions as these breed cholera. 2. Hogs should not be allowed access to irrigation canals and laterals. 3. A herd on the North Platte project of 312 Duroc-Jersey shotes to which the cholera treatment was applied shortly after the herd became infected in 1914. Only four of the hogs were lost. 4. Hog house near Morrill, Nebr. Clean, well-constructed hog houses are a good investment.

herds. The following features are particularly important in the control of cholera:

*Isolation of sick hogs.*—Should any of the hogs in a herd show signs of sickness they should at once be separated from the remainder of the herd and placed in a small quarantine pen. This should be done even though the presence of cholera is not definitely suspected. The animals should then be examined by a person competent to determine whether or not the disease is cholera. If any additional hogs become sick they also should be placed in the quarantine pen. All the sick hogs should be kept in the quarantine pen until they either recover or die.

The isolation is likely to retard the progress of the disease in the herd so as to allow the owner more time to make arrangements for treating his hogs should treatment appear to be desirable. A further advantage of isolation is that it reduces the likelihood of spreading infection around the farm, so that it is much easier to clean up the premises after the hogs have died or recovered than it would have been if the sick hogs had been allowed to run at large. The quarantine pen should be thoroughly disinfected every two days while the sick hogs are confined in it. This reduces the danger of infection being carried from the pen to other parts of the farm by dogs, birds, chickens, and other animals.

*The serum treatment.*—If cholera has appeared in a herd, the only safe plan is to treat the hogs with anti-hog-cholera serum. This method has been used successfully in a large number of localities. The serum treatment should be applied only by a competent veterinarian or by some other person who has had experience in this work.

*The serum supply.*—In order that the serum treatment may be applied promptly in case hog cholera appears on a project, provision should be made for the maintenance of a supply of serum. In localities situated near serum plants, it usually is possible to secure the serum within a short time after cholera appears; but when the serum plants are remote from the project, or the railroad facilities are not good, heavy losses may result in affected herds pending the arrival of serum. It is sometimes possible to make arrangements with the State serum plant for keeping a supply of serum on hand at some point near the project. This arrangement makes it possible to secure serum promptly when it is needed. It might be advisable for farmers to make arrangements with their State serum plant whereby a reserve of about 20,000 cubic centimeters of serum can be held subject to the farmers' order.

If a supply of serum is kept on the project, it should be kept in a refrigerator in summer and in a place where it will not freeze in winter. If serum is properly kept it will remain potent for as long as six months. It should be kept by some reliable person in the community and furnished to farmers as

needed, the farmers to pay the State plant for the amount used. Where such an arrangement can not be made, a number of farmers and business men may club together and, through a small assessment, purchase a supply of serum from some commercial serum plant.

*Disposing of dead animals.*—Hogs that have died from cholera should not be allowed to lie around the premises, but should be burned as soon as possible after death. Every farmer should be very careful to burn all the carcasses so as to prevent the disease from spreading in his community.

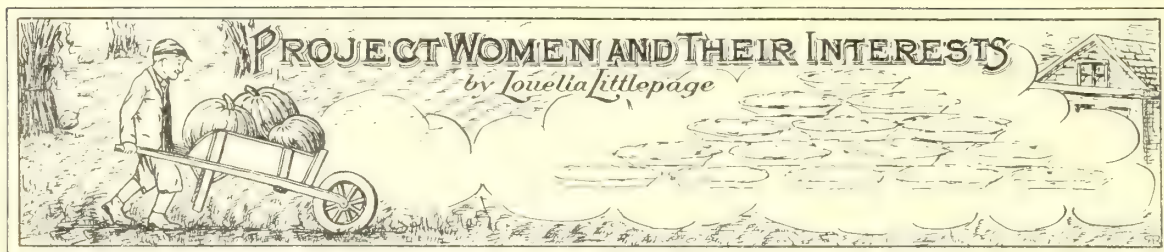
*Disinfection of premises.*—Cleaning-up and disinfection will be accomplished much more easily if the sick hogs have been confined in a quarantine pen, as indicated above. All straw and other litter around the pens and lots should be raked up and burned; the hog houses and sheds should be cleaned out and thoroughly sprayed with a strong disinfectant two or three times, and the whole area should be covered with air-slacked lime. The quarantine pen should be burned or thoroughly cleaned and disinfected. This cleaning and disinfecting not only rids the premises of cholera infection, but also destroys the germs of other diseases which seriously affect hogs.

### H. C. L. GETS ANOTHER JOLT.

At a meeting in the office of Chief Clerk E. J. Ayers, of the Interior Department, on December 11, 1919, action was taken whereby the employees of the department will be permitted to join the War Department Cooperative Stores Association upon payment of the regular fee of \$5, and so secure full privileges of purchasing food and clothing at considerably reduced rates. Twelve representatives from several of the Interior Department bureaus unanimously favored joining the well-organized War Department Association which has been in operation for several months, rather than establishing a separate store in the Interior Department Building, particularly in view of the close proximity of the War Department stores, the extensive line of commodities carried by them, and the advantage that membership cards give immediate access to the stores.

Over 1,000 employees of the Interior Department recently petitioned the Secretary for a cooperative store, so as a result of the action taken by their representatives it is likely that a large majority of the "heads of families" and others interested will avail themselves of this opportunity of dealing another body blow at the old enemy H. C. L. The Departments of State, Navy, and Labor, and the Federal Trade Commission have already joined the War Department Cooperative, giving this organization a membership of about 2,000, to which the Interior Department employees will probably add another 1,000 members.





### Speaking of Pie!

"Any fool," said a wise woman, "can be unhappy; it takes neither brains nor character for that. But out of the fragments and left overs and undesirables of life to achieve something fair and beautiful and soul satisfying, that is something to try one's powers upon."

Why then, for instance, worry about the sugar shortage? How much better off we are than during the war, when there was a ban not only on sugar but on wheat flour as well! Consider, I pray you, the predicament of our Pilgrim mothers, whose men worked quite as hard, or harder than ours, in wresting a living from the rocky New England soil. Their climate was as severe as any of ours. Their appetites could have been no feebler than those of our own men; pie would have stuck to their ribs as lovingly, but there was nothing to make into pies. No orchards had as yet had time to grow, no Mason jars were as yet available for canning the frugal surplus of wild fruit.

The Hebrews making bricks without straw were in no worse case. But in this emergency, behold the triumph of mind over matter, the typically brilliant achievement of American womanhood. For out of her pumpkins our Pilgrim foremothers made pies. Pumpkins were stock feed; it was not merely that she showed her resourcefulness in making them edible by human beings, something to quench hunger and tighten the belt and enable men doggedly to keep on with the day's work; but of them she made pies, delicious and delectable. She pared and cooked and strained them to a delicate fineness of texture, she sweetened them and made them piquant with spice, she etherialized them with the foamy whiteness of eggs, and spared for them the whole contents of fresh milk. With deft hands she fashioned the tender pastry, and with glowing coals heaped upon her Dutch oven she baked them to lovely shades of brown and gold.

The world is full of pumpkins, of hard, coarse, stubborn, big, unwieldy things, but herein is the beauty and glory of it, that we can turn them into pies.

While we are on the subject of sugar shortage—the farm woman has cause for thanksgiving, and that is that she *is* a farm woman, and if she is a farm woman on a Government irrigation project nine chances to ten

there are purebred cows on that farm, and consequently plenty of delicious cream for desserts.

Try the old-fashioned gingerbread, which calls for no sugar, served warm with plenty of nice cream as a dressing.

A famous dessert on one of the western railroad lines is preserved figs and cream. Preserved pears are just as delicious served this way, and many other preserved and even canned fruits are most satisfactory.

A very satisfactory sweet, especially for children, is the oatmeal drop cookie, and the recipe calls for no sugar:

$\frac{1}{2}$ cup fat.	$1\frac{1}{2}$ cups flour.
$\frac{1}{2}$ cup molasses.	$\frac{1}{2}$ teaspoonful salt.
$\frac{1}{2}$ cup corn sirup.	$\frac{1}{2}$ teaspoonful soda.
1 egg.	$\frac{3}{4}$ teaspoon cinnamon.
$1\frac{3}{4}$ cups rolled oats.	$\frac{1}{2}$ teaspoon cloves.
$\frac{1}{2}$ cup raisins.	$\frac{1}{2}$ teaspoonful allspice.
$\frac{1}{2}$ cup chopped nuts.	

Mix and drop from spoon on greased baking sheet or tin.

Bake in quick oven.

Individual spice cakes baked in muffin tins are good.

3 tablespoonfuls fat.	3 teaspoonfuls baking powder
4 tablespoonfuls sugar.	$\frac{1}{2}$ teaspoonful salt.
$\frac{1}{2}$ cup corn sirup.	1 teaspoonful cinnamon.
1 egg.	$\frac{1}{2}$ teaspoonful spice.
$\frac{1}{2}$ cup milk.	$\frac{1}{2}$ teaspoonful cloves.
2 cups flour.	$\frac{1}{2}$ cup chopped raisins.

Mix in order given.

Try this frosting on your next cake:

Cook one-half a cup of corn sirup until it forms a long thread when dropped from a spoon. Pour this over the stiffly beaten whites of two eggs, beating rapidly while pouring, and stir until stiff enough to spread.

Then there are pies! To be sure, melancholy dyspeptics and ardent dietary experts assure us that pie is unwholesome, but over a large section of the United States the toothsome triangle is a popular dessert, and if its persistent consumption has hindered the development of our Nation or prevented Uncle Sam from doing his proper share of the world's work, no one has seemed to notice it yet.

So many pies can be made with little sugar, especially by the woman who has her shelves filled with canned and preserved fruits, and especially on the farm is pie an acceptable dessert. To the man who

works all day in the open air custards and creams and fancy confections are airy nothings. He was not far wrong who, when asked, "What is meant by the Great American Desert?" replied "Pie." It is a distinctively American institution. Traveled epicures assure us that the fruit tarts which are supposed to be English equivalents of the American pie are but melancholy reminders of the gustatory delights of this side of the Atlantic. And although France is the famed land of dainty cookery, most of us are in accord with the good New England housewife, who, when told that the French had a greater variety in their desserts than the Americans, replied that she thought "closed liver, cross liver, and open face" was variety enough for anybody.

### Homes.

The dearest wish of woman is for a beautiful home, not necessarily the brownstone front or marble hall variety, but a cosy brown bungalow, or the dainty little white house with green blinds type, or the sand colored and red roof style. Many men have the same aspirations, and in that case behold painted buildings, neat lawns, trees, flowers, shrubs, and a general air of comfort and prosperity. Too often, however, especially in the country, is the house a dejected object, with sagging porch, bare yard, lawn a mass of weeds, and the whole picture of shiftlessness accentuated by the proximity of roomy barns with their up-to-date accessories. Another pumpkin to be made into pie!

If we live in poor surroundings we take a mental tone from them; we associate ourselves with poor things, poor farm equipment, poor home, and inferior standing in the community. This does not mean that the man with small or cheap equipment is inferior, but the point is that as we *keep* our surroundings our reputation rises and falls. The small house neatly kept, surrounded with trees set to show the place to advantage, is often more admired than the large, expensive, but ugly residence, with nothing to set it off or relieve the staring walls.

The inside of the house also has a deeper influence upon us than we are often inclined to believe. We have all seen homes that are "homey," that make us feel we are in a restful place. It is not the costly things that surround us so much as the taste in furnishings, the wall paper and the pictures, and, above all, the freedom from crowding of bric-a-brac and useless ornaments. The artistic room is not the one with every available space filled with ornaments, pictures, statuettes, needlework, etc. Indeed a positively bare room is much preferable.

The cleaning we need not do is the cleaning that wears us out. Not long ago a conscientious housekeeper, having been told by her physician that she absolutely must rest a certain portion of each day to avoid a complete breakdown, sat down disconsolately

to think the matter out. She suddenly realized that unconsciously she had been counting—counting pictures, counting chairs, figures in the wall paper, etc. At once she sat up very straight, her mind alert with a new idea. Then, she called her young son, who had been taking a technical course in the high school, and asked him to make for her two large boxes with hinged covers and put them in the attic.

She had swept and dusted that room every day for 20 years, but never before realized that in that 14 by 15 space there were 13 pieces of furniture, 27 pictures on the walls, 2 pairs of candlesticks, 4 bowls, 5 photograph frames, 8 vases, 3 lamps, 3 ash trays, a little birch bark canoe, a bunch of dried grasses, a fish bowl, a bird cage, a work basket, spreads and throws, magazines and papers and several unclassified and unclassifiable pieces of bric-a-brac. No wonder she was tired, especially as this was a fair sample of six other rooms.

The boxes were made in due time, and into them went every article from that living room except the absolutely useful ones. Five or six of the best pictures were retained and a couple of vases to hold flowers from the home garden. But of what she characterized as "trash," there remained not one vestige. Useless draperies were packed away and a number of pieces of furniture discarded. The result was a room so restful and roomy that the dining room through the folding doors appeared hopeless.

Boldly she entered and took from the walls the hideous pictures of poor dead game, and highly colored fruits. When she finished that room it contained besides the dining table and chairs a plain little china cabinet, a serving table, and one small copy of Corot's "Willows."

Then the family sat up and took notice. Father had the entire house papered and himself painted the woodwork and stained the floors, the children vied with each other in the arrangement of their rooms.

Mother spent a couple of weeks visiting her sister in town while the papering was going on, and now declares that cleaning is a positive joy in her simplified attractive home.

### Saving Clothes for Next Summer's Wear.

A methodical housekeeper has sent in some splendid suggestions for putting away summer clothing. If the rush of storing food, attending to the needs of the first school months and the holiday season has prevented you from attending to these duties, it is early enough to take these suggestions into consideration.

**Shoes.**—The pumps and oxfords should be carefully cleaned, repaired if needed, and put away out of the dust with shoe trees in each one.

**Hats.**—Have soiled hats dry cleaned; brush others, straighten trimming, wrap in tissue paper and put away in hatboxes, being careful that no weight rests upon trimming or delicate hats.



*Washable white clothes.*—Wash carefully; do not starch, but add a little more bluing than usual. Hang in a closet reserved for this particular use, or fold so that creases will correspond as nearly as possible with the folds into which the garment falls in use, and lay in a trunk or box.

*Washable colored clothes.*—Wash, do not starch, turn wrong side out and put away the same as the white clothes.

*Palm beach suits.*—Clean and put in separate boxes carefully folded and with rolls of tissue paper to protect from creasing.

One of the most important details is the careful inventory which should be made as the clothing is stored away, giving a list and the storage place of the clothes of each member of the family. This will prove of definite service when time comes for the spring sewing. *Label each box or drawer with slip or tag listing contents.*

### First Aid for House Plants.

"Flowers just won't grow for me," is a bromidic expression of many persons who don't really love flowers at all. They "grow" for anyone who cares enough about them to study their needs and give them proper care.

Most house plants have a hard time of it in the early winter, when the tonic of summer sunshine and showers still contrast vividly with the hot, dry stuffiness of the average living room. Ventilation sufficient for plant health is infrequent, and even the common needs for water and foliage sprinkling are often neglected. As a result edges of plant leaves become brown and the plants look sickly. Ferns, especially, should be copiously sprinkled frequently, indeed every morning is none too often, but a thorough sprinkling once a week will suffice if the atmosphere is kept reasonably fresh and moist. Broad leaf plants like palms and lilies should not only be sprinkled but washed occasionally with a soft cloth and soapsuds.

Few persons who keep plants have not been annoyed by injurious insects which either destroy the plant or greatly detract from its beauty. It is really a very simple matter to control these pests. In the first place, every plant that is brought into the house should be carefully examined. If insects are found upon it they should immediately be washed off with soapsuds or black leaf 40.

During the winter the plants should be examined occasionally for destructive insects. There are three kinds—biting insects, sucking insects, and scales. The last-named is really a sucking insect but is often put in a separate class for convenience.

A simple method of controlling all insects on small plants is to dip the plants in warm water. The temperature should be between 125° and 130° F., and

this should be ascertained by a thermometer—never by guess—as very few persons can accurately judge temperature within a few degrees. The plants should be held in the water for 12 seconds.

If plants are infested with scale insects it is well to dip them a second time, about one minute after the first immersion.

In the case of large plants the warm water treatment is impracticable, and different methods must be employed for the several kinds of insects.

The worm found on roses is a good example of the biting insect, which can always be killed by an arsenical spray. Arsenate of lead or paris green is commonly used.

The most common sucking insect found on house plants is the common green louse. On soft wooded plants the mealy bug, which has a covering resembling cotton, is often seen. A contact poison, such as black leaf 40 or a soapy spray, destroys sucking insects. Care should be taken not to use too powerful sprays, as house plants are tender.

Scale insects are often found on ferns, orange trees, lemon trees, and palms. To destroy, wash them off with a brush or rag dipped in soapsuds, care being taken that the solution reaches the insect beneath the scalelike covering.

### Vegetable Foods of Proved Value.

Mrs. R. F. Snead recently read the following valuable paper before the Home Economics Club of Yakima, Wash.:

"An increasing importance is becoming attached to the use of vegetables in the diet. Not only vegetarians but many others have found from experience that it is possible to live upon a vegetarian diet, and those that consume meat lay great stress upon vegetables as an agreeable accompaniment, either cooked or in the form of salads. Great gains have been made in the last few years in the abundance and the variety of vegetables.

"Formerly in winter we were limited to the use of carrots, tomatoes, squash, onions. Now a visit to a market in any of our large cities, even during the most unpromising season, shows an overwhelming variety of fresh vegetables. Add to these the large number which are canned and dried, and the housewife can supply her table well.

### COOKING IS IMPORTANT.

"Cooking of vegetables is a most important feature. In no line of cookery is there a better field for the housewife's skill. The vegetarian society will not have lived in vain if it does nothing more than to teach housewives how to cook vegetables properly and in more ways than one. If we would give as much study to the cooking of this food as we do to the

preparation of pastries and cakes, we would be a more healthful nation.

"In cooking mild-flavored, sweet-juiced vegetables, little or no water should be used. The mineral water in these vegetables is soluble and often discarded with the water in which the vegetable is cooked. Salt is added for flavor and to retain the colors of the green vegetables. It also tends to draw out juices and toughen fibers, so in a vegetable likely to become tough in cooking it should be added last.

#### HOW TO DO IT.

"Strong-juiced vegetables, such as turnips and onions, should be cooked rapidly in plenty of water, then throw away the water. Some of the food value may be lost, but we are willing to make a sacrifice for better flavor. Too long cooking makes vegetables dark colored and even more strongly flavored. Heat does not change the mineral matter, so there is no loss of food value in long cooking such as steaming or baking.

"It is a good rule to bake when you can, steam when you can, and stew or simmer in a little water.

"Vegetables contain all the five principal constituents of food. They are abundant in water, carbohydrates, and mineral salts and deficient in proteid and fats. Starch is the most important of carbohydrates and is familiar to us. It is manufactured by green plants and stored in different parts of the plant in the form of tiny grains.

#### CONSIDER POTATO.

"The first step in rendering starch digestible is hydration. An abundance of water must be used, either in soaking or cooking, unless vegetable in itself furnishes much water. Grains and dry vegetables require more water than others. All vegetables have more or less of a cellular envelop. The greatest amount is found in lettuce, in which the cellulose is so tender that it requires no cooking. Vegetables containing a large amount of starch are the potato, sweet potato, lentil, pea, and bean. Those containing much sugar are beets, parsnips, and sweet potatoes.

"The potato is the chief vegetable used in this country. Formerly it was said to have very little food value. On the contrary, although potatoes have only a small amount of proteid and less mineral matter than any other vegetable, they have large quantities of starch. This and their lack of marked flavor makes them an acceptable food to be used day after day."

#### VEGETABLE CLASSES.

"There is little proteid in vegetables, though the legumes or members of the pea family have much of this food. This proteid is only available as food after the vegetable has been subjected to long-continued

heat. There is a great difference in the digestibility of beans cooked from two to three hours and those cooked from 8 to 12 hours. The deficiency in fat in vegetables is often made up by the addition of butter, oil, or proteid from the animal world. French and Italian cooks combine meat and vegetables, thus gaining cheap and nutritious foods.

"Vegetables may be divided into different classes in accordance with the part of the plant we use. The stem is the carrier of water and nutriment to the plant. It is abundant in mineral matter and has little food value. Roots or tubers are the winter's storehouse of food for the next year's plant. In seeds all elements of the young plant lie dormant. Seeds rank high in food value and contain all food principles rich in protein. Fruits have carbohydrates in a small amount, but their chief content is mineral matter. Leaf or green vegetables contain most moisture and are valuable for mineral salts only.

#### BEANS VS. BEEF.

"Beans are a form of food not sufficiently appreciated by working people. They have been called the 'poor man's beef.' The old New England dish of pork and beans was a perfectly suitable and well-balanced food for a people spending much time in the open air in the strenuous pioneer work. Vegetarians and some subtropical people obtain their proteid largely from this food. The frijoles of the Mexican, soy beans of the Chinese, lentils of the Egyptian form an inexpensive substitute for meat. The soy bean is being introduced quite extensively in the United States and contains a high amount of proteid. When beans are on the menu, no meat is necessary.

"Cucumbers are the least nutritive of all vegetables and generally the most expensive. Fifty-cent cucumbers in midwinter are generally useless luxuries. The careful housewife buys such vegetables only in season.

#### USE 'EM IN SEASON.

"As a rule, when a vegetable is plentiful and consequently cheapest, it is at its best. Few forced vegetables possess the flavor of those grown under natural conditions. Out of season vegetables are not only expensive but lack flavor and quality. An abundance of water in vegetables is beneficial in summer when the heat of the body must be regulated. Even lentils and peas are 78 per cent water and green vegetables are 90 per cent fluid. Cabbage is really a more-water food than milk, since milk is only 87 per cent water, while cabbage is 90 per cent.

"Mother nature has wisely stored away in vegetables iron, lime, and sulphur. Each vegetable should be given a place on our table, not alone for its food value, but for the mineral salts necessary for the



proper development of our bodies. For anæmic persons there are no iron carriers so good as spinach or carrots."

### Project Notes.

#### PROJECT WOMEN LAUNCH DRIVE FOR COMMUNITY HOUSE.

The club women on the Shoshone project, Wyoming, want a community house, and they are more than liable to get it if they continue the way they have started. First, representatives from two clubs got together and talked the matter over; then they proceeded to interest a couple of other clubs, and at last reports practically all the women's organizations on the project were enthusiastic boosters.

#### ACHIEVEMENT DAY.

There were some proud and happy youngsters on the Carlsbad project, New Mexico, recently when annual achievement day for the members of the boys' and girls' clubs was celebrated at Artesia and Carlsbad.

Exhibits were inspected and prizes awarded, and club pins distributed.

#### CURFEW LAW FOR CHILDREN.

The town council of the town of Grandview on the Sunnyside unit of the Yakima project, Washington, has passed an ordinance making it unlawful for any child under the age of 15 years to be on the streets and other places in the town after certain hours, and prescribed a penalty. The ordinance reads as follows:

"SEC. 1. It shall be unlawful for any child under 15 years of age, unless accompanied by a parent, guardian, or other person having the legal custody of the child, to be on any of the streets, alleys, public squares, parks, or sidewalks of the town of Grandview after 8 o'clock p. m. during the months of September, October, November, December, January, February, March, and April, and after 9 o'clock p. m. during the months of May, June, July, and August, unless such child is there necessarily by reason of its employment or by virtue of a special written permit, dated on the date when such child is so found and signed by such parent, guardian, or other person having the legal custody of the child when so found on said streets, alleys, public squares, or sidewalks after the hours aforesaid.

"SEC. 2. Any child convicted before a justice of the peace having jurisdiction of municipal offenses of a violation of section 1 of this ordinance shall be fined a sum not less than \$1 nor more than \$5, and shall stand committed until such fine, together with costs, has been paid at the rate of one day for each \$3 of such fine and costs so imposed. Provided, however, that any child so arrested or convicted shall not be confined or in any way associated with regular prisoners or criminals."

### SLEIGHING.

The high-school pupils at Sidney, Lower Yellowstone project, Montana, have been enjoying a series of sleighing parties that take the old-timers back to their youthful days. At a sleighing party recently reported the participants left the schoolhouse in big sleighs made warm and "comfy" with plenty of fur robes, and after two hours in the open returned to the domestic science room and partook of a delicious lunch served by five eighth-grade girls.

Farther south on a project where snow is never seen the young people enjoyed a similar party, excepting that it was a moonlight ride in a partially filled hay wagon, with a bonfire on the river bank where lunch was eaten, marshmallows toasted, etc.

#### THRIFT ESSAY CONTEST.

Valley County schools, Milk River project, Montana, have been conducting a thrift essay contest in order to secure new maps of Europe.

#### HIGH SCHOOL PUPIL EXPERT COW TESTER.

Dairymen on the Grand Valley project, Colorado, are already reaping the benefits derived from the agricultural course in the public schools. Some of the growers of dairy cattle have in the past had their cows tested by an expert sent over from the agricultural college at Fort Collins at a considerable expense; this will be obviated when there shall be a cow-testing association formed in the valley. Meantime the dairymen have discovered that ample talent has been developed in the public schools.

The Garmesa farm people recently asked to have their cows tested, but as experts were scarce at Fort Collins the matter was taken up with the agriculturist in charge of that work in the schools. He immediately stated that he had some boys in his class of 28 who could do the work with a little help. He put the matter up to the lads, and upon a record shown by tests he selected Glen Hickman for the first work. The teacher accompanied Glen to Garmesa and assisted him the first day, then left him to complete the work. Two cows were to be tested for the year and 12 for a week's results. Young Hickman was paid the same wages as if he came all the way from Fort Collins—\$4 per day and expenses—and the owners saved the cost of transportation over the range.

The demand for intelligent boys who can do such work is growing very fast, as the cattle interests are coming to know the value of scientific methods applied to their dairy cows. In addition to their work for others, these boys will be well equipped to conduct their own dairy farms when the time comes.

## BOYS' RESERVE TO GET MEDALS.

Yakima, Wash., boys between the ages of 15 and 21 years who registered in the Boys' Working Reserve and worked at home while their older brothers were helping fight the Huns, are to be awarded bronze medals not greatly unlike the service buttons of the older boys.

The chairman of the reserve has been compiling information concerning the boys. All who registered in the reserve and worked six weeks during the summer will receive bronze medals. Those who worked more will receive a medal with a bar. Questionnaires asking about the work, employer's name, wages, total earned, and future plans, were sent out.

## EVERYONE WORKS ON THE YAKIMA PROJECT.

Members of the Portia Club in Yakima practice their own preaching and do manual labor. To partly solve the problem of cleaning weeds off vacant lots around town whose owners can not be found, the Portia Club volunteered to clear certain untenanted lots in the city. Certain lots and triangles were assigned various women, working under captains of the 10 city districts.

## A CORRECTION.

On page 515 of the November RECORD the women of the Carlsbad project were erroneously given credit for a report on Home Demonstration Work. This report was written by Mrs. Fannie W. Locke, of Mesilla, and the home demonstrator is Mrs. Sarah E. Van Vleck, of Dona Ana County, Rio Grande project. The Washington inspector, Miss Frysinger, made the statement that as far as she knew, Dona Ana County, N. Mex., had the greatest number of pressure cookers of any county in the United States, something like 60 being used there. A pressure cooker usually means an up-to-date homemaker. No wonder Mrs. Van Vleck is so highly appreciated by the citizens of that section. Mrs. Locke said:

"Our homemakers' clubs are really very successful, so much so that a good many of the ladies have given up other club work to have an opportunity to do more in their own immediate neighborhood. One of Mrs. Van Vleck's clubs down the valley did an immense amount of sewing last year for people who really needed assistance in the neighborhood, the home demonstrator cutting and planning the work. Also these clubs taught the use of old materials, and many of us are much better off in many ways for their existence."

Mrs. Locke also said: "We enjoy the RECORD so very much; don't let it be discontinued."

To save first; then to spend wisely—this is the solution of the thrift problem.

## When Suffrage Was Granted to Women.

Isle of Man	1881	England	1918
New Zealand	1893	Germany	1918
Australia	1902	Hungary	1918
Finland	1906	Ireland	1918
Norway	1907	Poland	1918
Iceland	1913	Scotland	1918
Denmark	1915	Wales	1918
Russia	1917	Holland	1919
Canada	1918	Sweden	1919
Austria	1918	Italy	1919
Czechoslovakia	1918		

## Ten Thrift Commandments for the Home.

Practical thrift in the home may be secured perhaps in no better way than through the adoption of the ten commandments as recommended by Walter H. Head, of Omaha, vice president of the national bank section of the American Bankers' Association. His commandments are:

1. Make a budget and stick to it.
2. Keep an intelligent record of expenditures.
3. Have a bank account.
4. Carry life insurance.
5. Make a will.
6. Own your own home eventually.
7. Pay your bills promptly.
8. Invest in war savings stamps and other Government securities.
9. Spend less than you earn.
10. Share with others. Thrift without benevolence is a doubtful blessing.

In this connection the following extract from one of Albert Hubbard's magazines is of interest:

"Ben Franklin is our great example of thrift. He wrote more on it and wrote it better than any other man we know. He began practicing thrift when he was 12 years of age, and he practiced it and wrote on it all his life. He became the richest man in America in his day, richest not only in money, but in health, brain, sanity, good cheer, influence. He was a scientist, a business man, a linguist, a diplomat, and philosopher. He always paid his way. He founded the University of Pennsylvania, founded the first public library in America, organized an insurance company, pretty nearly captured the lightning, invented spectacles, manufactured the first cook stove, went to France and borrowed money on which Washington fought the War of the Revolution, and the basis of all the strength and excellence of Benjamin Franklin lay in the fact that very early in life he acquired the habit of thrift.

"Thrift is a habit. A habit is a thing you do unconsciously, or automatically without thought. We are ruled by our habits. When habits are young they are like lion cubs, soft, fluffy, funny, frolicksome little animals. They grow day by day. Eventually they rule you. Choose ye this day the habit ye would have rule over you. The habit of thrift is simply the habit which dictates that you shall earn more than you



spend. In other words, thrift is the habit that provides that you shall spend less than you earn. Take your choice."—*Elbert Hubbard*.

Every mother knows that a baby a few weeks old quickly forms the habit of crying to be taken up. It

is during the first few years of life that the habit of orderliness, unselfishness, kindness to dumb animals, saving instead of destroying, and most other habits are formed. Being a mother is *some* responsibility.—*L. L.*

## SULPHUR IN RELATION TO SOIL.

By W. L. Powers, Professor of Soils, Oregon Experiment Station.

Investigators have generally agreed that the chemical elements in which soils are usually deficient are potassium, nitrogen, and phosphorus. In addition calcium is often needed in carbonate forms to correct acidity. The most extensive and elaborate fertilizer experiments have been worked out on this basis and the fertilizer business has developed to supply these elements. Sulphur has been long regarded as essential to plant growth, but the small amount formerly found in plant ash did not indicate that it was apt to be a critical or limiting element in crop production. During recent years, however, improved methods of analyses have shown that plants like alfalfa and the cabbage family contain much more sulphur than early analyses indicated. The average crop of 5 tons of alfalfa removes about 35 pounds of sulphur from 1 acre, whereas only 25 pounds of phosphorus would be contained in 5 tons of alfalfa. On the new basis rape has been found to contain 20 pounds of sulphur in a ton.

Hart and Peterson of the Wisconsin Experiment Station found sulphur removed by average crops of cereals to be about two-thirds of the phosphorus removed by these crops, while alfalfa required more sulphur than phosphorus. One hundred average crops of barley would require as much sulphur as is contained in the surface 8 inches of an average soil. Crops such as cabbage and turnips removed two or three times as much sulphur as phosphorus. They also found that soils cropped 50 to 60 years, unmanured, lost on the average 40 per cent of the sulphur originally present as compared to virgin soil. They calculated that the amount of sulphur lost in drainage water would exceed the amount brought in from the atmosphere by rain.

These facts led to renewed interest in sulphur content of soils and a thorough study of the sulphur content of Kentucky soil areas made by Shedd shows that the soils of that State usually contain less sulphur than phosphorus and that many staple crops responded to treatment with sulphur and sulphate. People have often applied sulphur to soil unknowingly in manure, potassium sulphate, ammonium sulphate, acid phosphate, and calcium sulphate for years.

A study of 20 years' results with fertilizer trials at the Ohio Experiment Station shows that the average yields from plants treated with acid phosphate, potas-

sium sulphate, or ammonium sulphate were higher than from those treated with fertilizers containing no sulphur.

Sulphur is used by the plant in the sulphate state, and Dr. Brown, of the Iowa station, has shown that different groups of bacteria are associated with sulphification or the changing of sulphur to available form. Similar studies have been made at the New Jersey Experiment Station. It has been suggested that the increased activity of nitrifying bacteria may be a chief benefit from sulphur fertilization. Bacterial counts are made from our sulphur and gypsum plats as well as check plats by the bacteriological department, Oregon Agricultural College, and indicate that greater numbers of bacteria are associated with the larger yields and with the use of superphosphate as well as sulphur.

In 1912 Dr. Reimer, working with acid phosphate and calcium sulphate on the Southern Oregon Experiment Station, found that increase in crop yield secured by these fertilizers could be produced by the use of elemental sulphur and was probably due to sulphate contained. The writer working independently in Deschutes Valley, Oreg., the same season found that calcium sulphate and potassium sulphate and acid phosphate gave substantial increases in yields over untreated plats or plats treated with potassium chloride. In the experiments by Reimer and Tartar, elemental sulphur was found to give even more marked increase in crop yield. During the following years more extensive trials have shown an average increase in Deschutes Valley of about one and one-fourth tons an acre from applications of sulphur in sulphate. In some experiments a gain of two and even three tons more alfalfa has been obtained in one season. Grain crops have shown 20 per cent increase from sulphur fertilization, though this may have been an indirect benefit. Eight pounds flowers of sulphur or about 200 pounds calcium sulphate have been found sufficient. The former benefits crops for at least four years while the latter form acts more promptly. Best results may be expected where sulphur is applied.

In southern Oregon increases as high as 500 per cent have been secured by Dr. Reimer. The other fertilizer elements have been eliminated as not giving substantial increases in yields on crops like

alfalfa; whereas, all the fertilizers containing sulphur have given increases. No injurious effect has been noted from heavy applications of sulphur in that section.

Use of sulphur on different soils and at different rates in various sections of Oregon strongly indicates that sulphur is of value to many soils of the State that lack sufficient of that essential element to permit continued farming and increased yields. Acid soils in Willamette Valley have shown little or no response to sulphur treatment though calcium sulphate is commonly used and is beneficial to legumes.



NO SULPHUR: YIELD PER ACRE, 3,300 POUNDS. ONE HUNDRED POUNDS OF SULPHUR PER ACRE: YIELD PER ACRE, 4,860 POUNDS. NET PROFIT, \$11.60.

Use of sulphur on acid or humid regions is not past the experiment stage and should be used only on a small scale for experimental purposes. Fertile loam at Medford and the Umatilla sand, which latter is low in organic matter, have not responded to sulphur treatment. Sulphur may be expected to be profitably used on alfalfa in the arid and semiarid sections of Oregon, especially in connection with irrigation. These soils are alkaline and contain relatively large amounts of lime. Sulphur trials by the writer during the past five years have doubled alfalfa yields in Goose Lake Valley, increased the yield by one and one-fourth tons an acre in Deschutes Valley, and by two tons an acre in trials in Klamath Basin. Other trials have given very substantial increases in yield in Baker and Grand Ronde valleys. In Columbia Basin less benefit has been derived from sulphur trials. This may be due to the low organic content of the sandy soils near the Columbia and the matter is under investigation.

It is estimated that 600,000 pounds of calcium sulphate have been used in Rouge River Valley during the past year on alfalfa and 185,000 pounds of the elemental sulphur have been ordered through the County Agriculturist for use on alfalfa land in Deschutes district the coming season. It is estimated that sulphur has been applied to 7,000 acres of alfalfa in Oregon this season with increased yield of a ton an acre on the average.

This increase of 7,000 tons of hay is worth \$20 a ton at present prices or a gross value of \$140,000.

Sulphur is believed to greatly benefit bacterial activity in the soil and is probably a limiting element for certain soils and crops. Sulphur may aggravate acidity in the humid sections and may act as a stimulant in releasing phosphorous and potash to some extent. Its use is certainly profitable and seems advisable on alfalfa in most arid and semiarid sections of Oregon; at least during the present hay prices. Its continued use would undoubtedly be most safely practiced in connection with feeding the hay on the farm and returning the manure produced to the land. Regular applications of manure have been found to keep up the sulphur supply in soil. The sulphur used here comes from Japan or from smelters while the calcium sulphate comes from deposits in arid sections. The cost of the treatment runs from \$2 to \$3 an acre. The benefits are extended over at least 3 years' time so that \$1 worth of sulphur should make a ton more hay. An average of six trials by County Agriculturist Spillman, of Union County, showed that calcium sulphate applied at the rate of 200 pounds gave an average net profit of \$18.10 an acre. Near Klamath and Redmond a 2-ton gain was secured at a cost of about \$3 and since the sulphur lasts 3 years or more this \$40 increase in crop was secured at a cost of not over \$1 per ton.

## ENGINEERING ASSISTANTS WANTED.

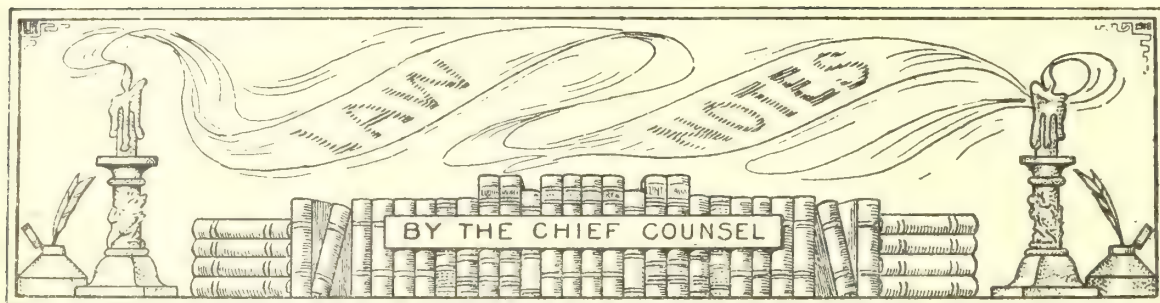
### Excellent Opportunities for Right Men.

WANTED.—One or more young men as engineering assistants in connection with the operation and maintenance of the Yakima project, Washington. The work consists of hydrography, water computations, design, and reconstruction of various irrigation structures. We want only men who desire to qualify by experience and hard work for the more responsible operation and maintenance positions such as irrigation manager, superintendent of irrigation, project manager, etc.

Although this work is not so spectacular as construction, it has many interesting phases and offers the advantage of more settled location, pleasant home life, etc. The construction engineer builds an irrigation system—the operating engineer builds a community.

There are many good opportunities for advancement in this field. The Yakima project has in the past decade furnished four project managers, two assistant managers, three superintendents of irrigation, and has had to turn down many other calls through lack of men to fill them.—*R. K. Tiffany, project manager, Yakima, Wash.*





### Foreclosure of Lien for Water Charges by Water Users' Association.

A water user under the Carlsbad irrigation project, in New Mexico, having failed to pay water charges announced by public notice, the Pecos Water Users' Association was requested by the Reclamation Service to proceed to collect the same in accordance with its contract with the United States, under which the association guaranteed payment of such charges. The water user in his subscription for stock in the association had agreed that all water charges against his land should become a lien thereon and be enforced against him in accordance with the by-laws of the association. These by-laws provided for a summary remedy by which the lands could be advertised and sold without invoking the aid of the courts. This procedure was followed in the instant case, and the land was sold and conveyed to a third party. Question having arisen as to the title so conveyed, suit to quiet title was brought by the grantee in State district court, Eddy County, N. Mex. (W. A. Moore, v. C. A. Cunningham et al.) October 9, 1919, the trial judge entered a final judgment upholding the proceedings and the title to Moore.

### Refund of Moneys to Applicant at Drawing for Public Land.

It is now the policy of the Reclamation Service to incorporate in every public notice providing for a drawing for public land, a provision to the effect that no part of a payment made will be returned to a successful applicant in any case if he be a qualified homestead entryman. This provision is intended to establish a contractual relationship upon this point between the applicant and the Government, which would not exist without it. At any time prior to a drawing an applicant may withdraw his application and secure a refund of his deposit upon request, but after a drawing has been made determining the successful applicant, the latter will not be permitted to withdraw his application and secure a return of his deposit. (Reclamation Decision, Nov. 11, 1919, Shoshone.)

### Temporary Water Supply During Drought to Avert Calamity.

Where farms and towns located on a river within a Federal irrigation project depend upon the flow of the river for their domestic and stock-water supply, and because of severe drouth the river becomes dry, the Secretary of the Interior has a right temporarily and until rains relieve the situation, to discharge water from the project storage works into the river after the close of the irrigation season, thus averting a calamity, requiring, however, payment in advance of the costs involved, including a reasonable charge for the use of the works. (Departmental Decision, Aug. 21, 1919, Milk River.)

### Federal Reclamation Without the Use of Federal Funds.

A novel and interesting reclamation bill (S. 3477) was introduced in Congress December 3, 1919, by Senator Reed Smoot, of Utah. It authorizes the Secretary of the Interior, through the Reclamation Service, to investigate and develop projects anywhere in the United States exclusively with private funds. The text of this bill follows:

A Bill To increase, without expenditure of Federal funds, the opportunities of the people to acquire rural homes, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of the Interior, through the Reclamation Service, is authorized to investigate and determine the feasibility of developing tracts of land in private ownership, by reclamation and otherwise, for the purpose of subdividing the land and disposing of the same in farms and parcels at reasonable prices.

Sec. 2. That after the Secretary of the Interior has determined the feasibility of a project, he is authorized, through the Reclamation Service, to develop the land to such extent, and dispose of the same in farms and parcels in such manner and upon such terms as to him shall be deemed most feasible and practicable.

Sec. 3. That no moneys of the United States shall be expended for any of the purposes of this act, nor shall either the investigation or development of any project be commenced or any obligation incurred therefor until a contract shall have first been made by the Secretary of the Interior with the owner or own-

ers of the land, providing for the payment in advance of sufficient moneys to meet the cost of such investigation or development. The moneys provided by every such contract shall be deposited with the Treasurer of the United States as a trust fund, and shall be disbursed by a duly authorized fiscal officer of the Government under the direction of the Secretary of the Interior and in accordance with the terms of such contract.

SEC. 4. That every contract for development of a project shall provide, among other things, that the developed farms and parcels shall be sold to persons who desire to occupy the same as homes, at the actual cost of the land and the development thereof plus a definite reasonable profit to the owner or owners stated in advance therein. All contracts for the purchase of lots and farms shall be made payable to the owner or owners of the land or their assigns.

### Oregon to Guarantee Interest on Irrigation and Drainage Bonds.

House joint resolution No. 32 of the Thirtieth Legislative Assembly of the State of Oregon (General Laws, Oregon, 1919, p. 848), provides for an amendment to the Constitution so as to permit the State to guarantee payment of interest for five years on bonds "heretofore or hereafter issued by irrigation and drainage districts organized, or to be organized, under the laws of the State of Oregon." The amendment was approved and made immediately effective by a referendum of the people, on June 3, 1919.

### Leave of Absence for Soldier Entrymen Taking Vocational Training.

An Act To authorize absence by homestead settlers and entrymen, and for other purposes. (Act Sept. 29, 1919—Public, No. 52, 41 Stat. —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That every person who, after discharge from the military or naval service of the United States during the war against Germany and its allies, is furnished any course of vocational rehabilitation under the terms of the vocational rehabilitation act approved June 27, 1918, upon the ground that he comes within Article III of the act of October 6, 1917, fortieth volume, Statutes at Large, page 398, and who before entering upon such course shall have made entry upon or application for public lands of the United States under the homestead laws, or who has settled or shall hereafter settle upon public lands, shall be entitled to a leave of absence from his land for the purpose of undergoing training by the Federal Board for Vocational Education, and such absence, while actually engaged in such training shall be counted as constructive residence: *Provided*, That no patent shall issue to any homestead settler who has not resided upon, improved, and cultivated his homestead for a period of at least one year.

### Limitations Regarding Stock-Raising Homesteads.

An Act To amend sections 4 and 5 of an Act entitled "An Act to provide for stock-raising homesteads and for other purposes," approved December 29, 1916. (Act Sept. 29, 1919—Public, No. 51, 41 Stat. —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That sections 4 and 5 of the act entitled "An act to provide for stock-raising homesteads, and for other purposes," approved December 29, 1916, be amended to read as follows:

"SEC. 4. That any homestead entryman of lands of the character herein described who has not submitted final proof upon his existing entry shall have the right to enter, subject to the provisions of this act, such amount of lands designated for entry under the provisions of this act, within a radius of twenty miles from said existing entry, as shall not, together with the amount embraced in his original entry, exceed six hundred and forty acres, and residence upon the original entry shall be credited on both entries, but improvements must be made on the additional entry equal to \$1.25 for each acre thereof: *Provided*, That the entryman shall be required to enter all contiguous areas of the character herein described open to entry prior to the entry of any noncontiguous land.

"SEC. 5. That persons who have submitted final proof upon, or received patent for, lands of the character herein described under the homestead laws, and who own and reside upon the land so acquired, may, subject to the provisions of this act, make additional entry for and obtain patent to lands designated for entry under the provisions of this act, within a radius of twenty miles from the lands theretofore acquired under the homestead laws, which, together with the area theretofore acquired under the homestead laws, shall not exceed six hundred and forty acres, on proof of the expenditure required by this act on account of permanent improvements upon the additional entry: *Provided*, That the entryman shall be required to enter all contiguous areas of the character herein described open to entry prior to the entry of any noncontiguous land."

Will R. King.

### RECLAMATION RECORD INDEX.

The index to the 1919 volume of the RECLAMATION RECORD will be available soon for distribution.

We again renew our suggestion to our water users that they save and bind their copies of the RECORD. Write to the chief clerk of the Reclamation Service, Washington, D. C., for a copy of the index. This will enable you to find that article which meets your particular needs, but the location of which you have forgotten. This may save you money.



## CONGRESSIONAL JOINT COMMISSION ON RECLASSIFICATION OF SALARIES.

By W. I. Swanton, Assistant Engineer, U. S. Reclamation Service.

By the second Monday in January, 1920, the Congressional Joint Commission on Reclassification of Salaries, consisting of three United States Senators and three former Congressmen, is required by law<sup>1</sup> to make its report to Congress.

This commission is charged with the duty of classifying or standardizing positions and recommending salaries for more than 100,000 civilian employees in the municipal government and executive departments of the Federal Government service in the District of Columbia. Those in the military or naval service, in the Postal Service, and in the Washington Navy Yard are excluded from classification by this commission, as are likewise the hundreds of thousands of employees outside of Washington.

The direct work of classifying the positions, recommending salaries, and carrying out the clerical and statistical work is under direction of the firm of Arthur Young & Co., of Chicago, and a force of about 100 persons, including the writer, has been detailed from the various departments, bureaus, and independent establishments to assist the commission and headquarters staff in this work.

In order to secure data as a basis for the work, a "classification questionnaire," 8 by 10½ inches in size, was sent to each of the 100,000 persons affected by the law. This card contained space for data, including name, position, place of work, compensation, hours of work, supervisory responsibility, age, length of service, and duties. Data were also required from the immediate superior of the person in regard to qualifications for the position, including education, experience, and personal characteristics.

The questionnaires, after being filled out by the employees, are filed with the commission and form the basis for all classification, supplemented by individual investigation in many cases.

The next step in the work was the charting of the entire Government service in Washington, as an aid to indicating the lines of authority and the relative importance of the various divisions of the Government establishment. About 750 charts were prepared and have been arranged and filed in a convenient form for reference.

On the completion of the charts the questionnaires were distributed, according to duties specified on cards, into about 60 different services, from accountancy to theology and including such broad lines as scientific, technical, engineering, education, law, library, clerical, skilled and unskilled labor services, and all of the activities in which the employees of Uncle Sam are employed.

The cards thus distributed to services were turned over to a classification staff for the purpose of having definitions of specifications of each position written and the cards of each service divided into classes or grades. In all of this work the thought kept in mind was to classify or grade the particular job without regard to the person actually holding the position; in other words, to consider this work from an impersonal viewpoint so far as possible.

The classification suggested for the civil engineering service, for example, is as follows:

Title of class.	Salary recommended.	
	Minimum.	Maximum.
Junior engineering aid.....		
Civil engineering aid.....		
Junior civil engineer.....		
Assistant civil engineer.....		
Associate civil engineer.....		
Civil engineer.....		
Senior civil engineer.....		
Chief of bureau.....		

In this connection it may be of interest to note that a special definition or specification was set up for the Director and Chief Engineer of the Reclamation Service, due to the combination of duties required for this important position.

While the work of classification was in progress a research staff was engaged in securing data in regard to the cost of living in Washington, and the salaries being paid to persons outside the Government service doing the same character of work. This investigation was conducted by agents of the commission who visited cities as far north as Boston and as far west as Pittsburgh in order to secure comparable data as a basis for salary recommendations.

As soon as the cards of a given service had been classified and specifications written, a public hearing with the commission was held in order that an opportunity might be given to those interested to offer any suggestions or constructive criticisms before final approval and printing of the specifications.

The library service was the first to be heard, and among those present at the hearing were the heads of the Library of Congress and of the Washington Public Library. The hearing on the engineering service was held on December 17, and Burton McCollum, electrical engineer of the Bureau of Standards, presented a brief for the engineers of the Government service, of whom there are between 2,000 and 3,000 in Washington. Hearings on the clerical services, which include about 60 per cent, were among the last to be held.

<sup>1</sup>Sec. 9, Public 344, 65th Cong., approved Mar. 1, 1919.

In connection with the work of this commission, there have been temporarily brought together, directly in the office, or indirectly, in the field and investigational work, between 200 and 300 employees of the Government in Washington from all of the departments and bureaus. Conferences are held at intervals, and in this way the exchange of ideas has resulted in securing the best ideas and suggestions of all in furthering the work of classification. Conferences are also held with bureau and administrative heads, and in this way interest is aroused in the work of the commission, and important constructive ideas are obtained.

In connection with the public hearings briefs are prepared and representatives from outside organizations give testimony, so that the interest in the classification is becoming more widespread, and when the report of the classification of Washington employees is presented to Congress the work of the commission will be understood by a large number of persons and organizations throughout the country.

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### BOUND VOLUME OF 1919 RECLAMATION RECORD.

Bound volumes of the 1919 RECLAMATION RECORD will soon be available. In view of the limited number bound, not more than two copies will be sent to each project or other field office, and then only on condition that two complete files of unbound copies for the year are returned to the Washington office.

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Just finished looking through the RECLAMATION RECORD. A fine little magazine.—*Hon. John M. Baer, Representative in Congress from North Dakota.*

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The Government, through the Savings Division of the Treasury Department, is actively interested in promoting a spirit of thrift in America. In furthering this purpose it issues an unusually attractive Government security in the form of the War Savings Stamp, which is well adapted to the use of those who wish to accumulate a fund for old age.

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If at 25 a man begins to accumulate a fund for old age by hiding somewhere a dollar a week he will have \$2,080 when he is 65 years old. If he buys War Savings Stamps at the rate of \$1 a week and keeps at it he will be absolutely certain to have over \$5,100 at that time.

### NOVEMBER WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

November in the Western States, like the month before it, was mainly cold, with more than normal precipitation. Much of the first week was warm from Oregon and northern California southeastward to New Mexico and the southern Plains, but that week was cold from the Cascades eastward to the Missouri River. The second week was cold practically everywhere east of the Pacific coast region. From about the 15th to 23d mild weather prevailed in all districts, and in the southern portions continued to the 25th or 26th. The remainder of the month was decidedly cold. The month averaged from 7° to 10° below normal temperature in large portions of the Dakotas, Wyoming, and Montana, and slightly below normal in most other western districts, save some portions along the Pacific coast or in the Rio Grande drainage area.

During the first week there was precipitation of importance in practically all northern districts, and many near or eastward of the Rocky Mountain Divide had precipitation about the 8th. The middle portion of the month brought abundant precipitation in western Washington and northwestern Oregon, but in most States the chief period of precipitation came at the close, and in parts of California this was the only important precipitation during the month. The precipitation of the entire month was greater than normal in nearly all parts of the Plains and Rocky Mountain regions, the southern Plateau, Arizona, and western Colorado having especially large amounts for the region. There was a marked deficiency, however, in California, and a smaller one in Nevada, and in most districts north of the forty-second parallel of latitude and west of the Rocky Mountain Divide.

The weather of November was unfavorable for live stock in the Northwest, owing to cold and snow, and likewise for outdoor work. In California the dryness was bad for the ranges, and prevented much plowing and seeding. In Arizona and adjacent districts conditions were favorable for stock, and in most districts east of the Pacific States fall-sown grains were favored. The weather interfered considerably with digging of sugar beets, but very little with fruit picking.

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The man who saves erects a bulwark against sickness or adversity; builds a bridge to the better job; takes in hand a tool to grasp opportunity; sets up a ladder to climb in the world; gains control over money and things; trains himself for growing responsibility; and buys War Savings Stamps.



## MONTHLY PROGRESS REPORTS FOR NOVEMBER.

Monthly conditions of principal Reclamation Service reservoirs for November, 1919.

(Elevation above sea level.)

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.	Roosevelt <sup>4</sup> .	1,305,000	2128	1903	582,844	712,406	712,406	23,380	2071.58	2082.98	2082.98
California, Orland.	East Park.	51,000	1199.68	1111.68	326	325	326		1132.81	1132.79	1132.81
Idaho:											
Boise.	Arrowrock.	280,000	3211	3018	8,114	22,545	27,360	35,744	3024.8	3060.9	3069.5
	Deer Flat.	177,000	2518	2488.6	28,278	40,803	40,803	0	2496.9	2499.3	2499.3
Minidoka.	Lake Walcott.	53,500	4245	4240	7,400	39,970	43,580	3,610	4240.7	4243.68	4244
	Jackson Lake.	846,000	6769	6730	21,370	50,420	50,420		6731.24	6732.9	6732.9
Montana:											
Milk River.	Nelson.	27,000	2212	2200	25,700	24,000	25,739		2211.5	2211	2211.5
St. Mary Storage.	Sherburne.	33,000	4765	4720							
Sun River.	Willow Creek.	16,700	4130	4085	980	1,103	1,103	0	4099.1	4100.1	4100.1
Nebraska-Wyoming, North Platte.	Pathfinder.	1,070,000	5852	5670	173,400				5778.64		
	Lake Alice.	11,400	4182	4159	10,695	8,291	10,695		4181.1	4177.8	4181.1
	Lake Minatare.	67,000	4125	4074	61,500	62,000	62,000		4124	4124.4	4124.4
Nevada, Newlands.	Lake Tahoe.	6 120,000	6230	6 6224	0	0	0	0	6225.52	6225.1	6225.52
	Lahontan.	290,000	4162	4060	123,960	140,400	140,400	0	4140.7	4144	4144
New Mexico:											
Carlisle.	McMillan.	51,000	3267.7	3241.6	22,500	31,850	34,850		3263.2	3265.8	3265.8
Rio Grande.	Elephant Butte.	2,637,000	4407	4231.5	989,817	999,273	999,273	19,000	4351.75	4352.2	4352.2
Oregon, Umatilla.	Cold Springs.	50,000	621.5	590	1,500	7,750	7,750	0	567.03	581.43	581.43
Oregon-California, Klamath.	Clear Lake.	462,000	4540	4514	310,000	307,700	310,000	32	4534	4533.9	4534
South Dakota, Belle Fourche.	Belle Fourche.	203,000	2975	2920	76,030	90,250	90,250	0	2954.9	2958	2958
Utah, Strawberry Valley.	Strawberry.	250,000	7558	7517	162,000	163,000	220,000		7546	7546.1	7558
Washington:											
Okanogan.	Conconully.	13,000	2287	2232	471	790	790	0	2244	2247	2247
Yakima.	Bumping Lake.	34,000	3426	3389	2,185	11,465	11,465		3392.4	3405.3	3405.3
	Lake Clealum.	22,800	2134	2122	6,460	29,134	27,565	1,435	2125.8	2134.9	2135.5
	Lake Kachess.	210,000	2258	2192	144,445	121,035	121,035		2131.6	2133.4	2133.4
	Lake Keechelus.	152,000	2515	2425	8,280	27,795	27,795		2431.6	2446.6	2446.6
Wyoming, Shoshone.	Shoshone.	156,600	5360	5132.3	314,211	339,386	354,241	33,680	5343.4	5340.6	5343.4

<sup>1</sup> Or: maximum storage.<sup>2</sup> Or: zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> U. S. storage begins at elevation 6229.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—

Very little water was run in the canals during November owing to the demand for irrigation water being very light. There was no water run at all from the 26th to 30th due to the severe storms at that time.

There were six maintenance crews in the field and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 204; average head of stock, 55; miles main canals cleaned, 26½; miles laterals cleaned, 112½; number of new structures installed, 6; number of old structures repaired, 196; riprap placed, 3,995 feet; dirt fill placed, 450 cubic yards; concrete placed, 9 cubic yards; concrete pipe laid, 148 feet.

Drag-line excavator No. 1 widened the Eastern Canal from Station 239 to 259, removing 5,300 cubic yards of dirt.

The Ruth excavator traveled from lateral 18½ to 13½ on the east branch of the Consolidated Canal, a distance of 6 miles, removing 5,280 cubic yards of dirt.

*Operation of power system.*—The Roosevelt power plant operated continuously during the month. Work was started on the installation of anchors for support of the new 45,000-volt bus control cable between power house and transformer house. The Cross Cut power plant operated 81 per cent of the month, the South Consolidated plant 80 per cent, and the Ari-

zona Falls plant 18.5 per cent, all being shut down at times when there was no water in the canal. The Chandler power plant did not run during the month, work being in progress on the changes in the construction of the fore bay.

All pumping plants were available for use as needed. All the new pumping plants are ready for operation at any time needed. Work was commenced on the annual overhauling of the pumps at the Highline pumping plant.

*Construction work, Roosevelt.*—Work on the north tunnel was carried on as vigorously as possible during the month. Two shifts were worked. The excavation was completed and work started installing the pipe, which it is estimated will be finished ready for the concrete the latter part of December. Sand, rock, and cement are all on the ground ready for concrete mixing. The concrete will be run into the tunnel by gravity from the top of the dam, a riser being opened from the upper end of the tunnel vertically about 12 feet to the open. This work is being pushed with all possible speed.

*Chandler power plant.*—The work on reconstruction of the fore bay is about 60 per cent complete. The excavation is completed, the penstock lowered, and work commenced on the forms for the concrete. A week of bad weather delayed operations here considerably.

*Pumping plants.*—The construction work on the 38 pumping plants was finished.

*Mesa switching station.*—The transformers were placed, dried out, and filled with oil; the pipe framework installed and the line entrance bushings installed.

The switchboard material arrived the last of the month and is now being installed.

**Office.**—The following are the acreages entitled to irrigation water service on the first of the month:

	Acreage.	Number of applications.
Permanent.....	121,397.75	2,902
Normal flow.....	857.50	203
Temporary.....	6,286.00	145
Town sites.....	3,943.75	5
	132,485.00	3,255

—W. R. Elliott.

#### YUMA PROJECT, ARIZONA-CALIFORNIA.

November weather and labor conditions were favorable.

**Construction.**—On the Yuma Valley main drain about 16,000 cubic yards of material were moved in excavating the channel to grade.

**Operation and maintenance.**—On the Yuma Indian Reservation the maintenance crew was engaged in raising low canal banks and cleaning canals of brush and silt.

In the Yuma Valley the V machine was put in operation cleaning canals on the 26th.

Water deliveries were 2,043 acre-feet.

The cotton market has been good, short staple cotton reaching as high as 51 cents per pound.

The high prices received for cotton have promoted considerable activity in the realty market.

A great many inquiries have been received concerning the proposed auction sale of the mesa lands in unit B. Pamphlets describing the land and giving the terms of the sale are being sent to inquirers and distributed to those interested.

The maximum discharge of the Colorado River for the month was 82,600 second-feet with a gauge height of 28.3. This was a flash rise occurring on the 30th and was due to heavy rains on the Gila River watershed. The minimum discharge during the month was 5,800 second-feet, mean discharge 10,176 second-feet. The acre-feet discharge for the month was 605,514.

Morris Bien, assistant to the director, F. E. Weymouth, chief of construction, and Oliver P. Morton, district counsel, were visitors during the fore part of the month. J. L. Burkholder, drainage engineer, Denver office, examined the drainage works of the Yuma Valley. C. E. Piatt, examiner of accounts, and his assistant arrived at the project on the 25th. Capt. Harrison Brand, jr., came on the 29th to take charge of the work of raising the Yuma City levee. This work is being done under the direction of the U. S. Engineer office, Los Angeles.—W. W. Schlecht.

#### ORLAND PROJECT, CALIFORNIA.

November weather continued cold. The mean temperature was 52.12°, which is exceptionally low for the month. There was a great deal of wind, with one exceptionally severe wind storm which was general throughout the State and resulted in considerable damage in the interior valleys as well as along the central and northern coast. The precipitation was 0.19 inch; the normal for the month is 2½ inches. A force of 24 head of stock and 16 laborers was employed on maintenance work until the latter part of the month, when the major portion of the outfit was disbanded with the purpose of completing the remain-

der of the team work after the first of the year. Forty-two miles of canals and laterals were cleaned and repaired. A small head of water was turned into the South Canal on the 5th and was run for about a week in irrigating olives and oranges. The average force employed in concrete lining was 45 laborers and 16 head of stock. The amount of lining placed was 14,200 square yards (675 cubic yards). Some farm development work was in progress, but due to lack of rain, the work was being done at great disadvantage. There was decided activity in land transfers, and while most of the transactions involved improved farms, more undeveloped farms were taken by settlers than for any recent previous month. Threshing of milo maize was completed. The picking of grade olives suitable for pickling was about completed at the close of the month, and the remainder of the crop will be used for making oil. On the 26th packing of oranges was commenced at the association warehouse. There was an advance in the price of hay, live stock, butter fat, and eggs. Carload shipments were: Alfalfa, 14; barley, 7; milo, 4; oranges, 1; dried fruit, 1; wool, 2; and live stock, 8. Less than car lots: Butter fat, 55,000 pounds; eggs, 5,000 dozen; poultry, 48,500 pounds; and olives, 18,000 pounds.—A. N. Burch.

#### GRAND VALLEY PROJECT, COLORADO.

The weather during November was warm and fair until the 26th, when a record-breaking storm was experienced. About 2 feet of snow fell in the valley, making the roads nearly impassable for several days and putting an end temporarily to all outside work. Labor was available in excess of the needs of the project.

The harvesting of all crops has been completed with the exception of sugar beets. Practically all beets were out of the ground at the time of the storm, but a considerable percentage of the crop is still in the field, either siloed or covered with tops. The yield of beets is turning out somewhat better than was expected and will probably average over 10 tons per acre. It is feared that there will be some loss of range cattle and sheep on account of the heavy snow, and for the same reason the demand for hay has stiffened.

Water deliveries for irrigation were discontinued on October 31, but a small head of water was run in the main canal until November 12 to permit the filling of cisterns. A small maintenance force was employed in building and installing weirs and turnouts, painting steel flumes and other structures, and on miscellaneous repair work on the main canal.

The drainage construction in the Grand Valley drainage district was prosecuted with three drag-line excavators working two shifts per day until the 26th, when work was temporarily suspended on account of unfavorable weather, but at the end of the month the operation of the machines was resumed. Two excavators were employed on the drainage of the Indian school lands for the State of Colorado and the third was used on the cooperative work. One and five-tenths miles of open drain were completed, involving 48,500 cubic yards of excavation.

District Counsel E. W. Burr and Examiner of Accounts C. E. Piatt visited the project during the month. The project manager visited the Strawberry Valley project and attended the irrigation conference at Salt Lake City on the 21st and 22d.—S. O. Harper.

#### UNCOMPAHGRE PROJECT, COLORADO.

The weather during the first 25 days of November was excellent for all farm, operation and maintenance,



and construction work. During the remainder of the month there was no work on account of an unusual fall of snow, 21½ inches falling on the 26th, 27th, and 28th. Total snowfall for the month was 24.5 inches, the precipitation amounting to 1.98 inches.

The harvesting of all crops was completed except for the thrashing of a small amount of grain. A considerable amount of pasture was rendered practically useless by the snow, which will make it necessary to feed more hay to live stock than usual.

A small amount of water was carried in most of the canals for stock and domestic use. Good progress was made with all maintenance work. The work of repairing the Montrose and Delta slides was practically completed. All flumes on the West Canal and the Montrose and Delta were repaired and a considerable number tarred. The last of the rails and trolley wire from the Gunnison Tunnel were shipped during the first part of the month. The construction of a culvert under the Loutsenhizer Canal was 75 per cent completed.—*Fred D. Pyle.*

#### BOISE PROJECT, IDAHO.

The weather during November was unfavorable for construction and operation and maintenance work. Frequent rain and snow storms delayed the canal cleaning. Freezing weather during the latter part of the month retarded all operations.

*Labor conditions.*—Labor conditions remained unchanged from the previous month. The completion of fruit picking and general farm work released a number of men. A large amount of highway work throughout this section offered employment for a large number of men and teams.

*Farming operations.*—Wet weather retarded clover seed hulling which should have been completed during the month. Some hay was baled and shipped but the major portion of the crop is being fed on the farms. Until the latter part of the month, when freezing weather set in, a considerable acreage was plowed for next season's crop.

*Water supply.*—The snowfall on the Boise River drainage basin was above normal and should supply late water during the coming season. The discharge of Boise River was below normal, being slightly above the mean for the four lowest years of record.

*Operation and maintenance.*—Water was turned out of the Main Canal on the first of the month to allow the sluicing of sand that had accumulated back of the diversion dam, and was gradually being taken into the Main Canal. Sluicing continued until the 20th and resulted in the removal of approximately 100,000 cubic yards of material.

Water was turned into the Main Canal on the 20th and during the balance of the month was carried into Deer Flat Reservoir, the average head being about 600 second-feet.

About 70 teams were employed during the portion of the month that weather conditions permitted in cleaning and repairing laterals.

*Construction.*—Concrete work on the Notus Canal siphon under the Boise River was completed. Stormy weather interfered with the backfilling of this structure, but this work was well under way, and if weather permits can be completed in December.

*Drainage.*—On the Riverside drainage work operations were continued with two drag-line machines, each working two shifts.

*Surveys.*—Surveys during the month consisted of the continuation of ground-water investigations in the Riverside district and the west end of the project. Lines and grades were given for the construction work in progress.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

November weather was favorable for construction work. Labor was quite plentiful and the shipping of men from outside points was discontinued.

At Camp 4 the 1-mile flume with bell and spigot expansion points was completed on the 19th and work was in progress on the flume without expansion joints during the latter part of the month.

At Camp 5 the excavation of the flume bench for the combination concrete and gunite flume was completed on the 6th and concreting of the floor was started on the 8th.

Concrete was mixed at Spillway 8 and hauled with dinky engines on the 36-inch gauge track along the flume bench to the site of the work. The cement guns and air compressors were set up during the fore part of the month and work was started on the gunite flume on November 14. A total of 493 feet of this type of flume was constructed during the month. Construction work on Deer Gulch wood-stave siphon was resumed on the 19th. Excavation for the inlet structure and for the pipe pedestals on the east slope of the gulch was completed.

Excavation for the trestle piers at the bottom of the gulch was about 50 per cent completed at the end of the month. The excavation of the flume bench for the semiprecast concrete flume was about 95 per cent completed at the end of the month and work on laying track on this bench was started. The incline railroad to the block yard was completed. Work was started on Spillway 9, the excavation, placing of steel in forms, and pouring of the floor were completed during the month.

One engineering field party was employed at each camp in connection with construction operations.

The office engineering and clerical forces were employed during the month on routine work.

The operation and maintenance forces, working under the management of the King Hill Irrigation District, were employed on cleaning laterals and repairing minor structures.

There were no official visitors on the project during the month.—*Walter Ward.*

#### MINIDOKA PROJECT, IDAHO.

November weather was clear and favorable, but quite cold the latter part of the month. The discharge at Howells Ferry amounted to 284,263 acre-feet as compared with 203,766 acre-feet for October. At Jackson Lake the gates remained closed throughout the month and the water surface rose from 6,731.24 on October 31 to 6,732.50 on November 22, corresponding to a storage of 22,010 acre-feet during the period, and 43,380 acre-feet to date. On the corresponding date last year the storage amounted to 231,820 acre-feet.

The irrigation conference at Salt Lake City on November 21 and 22, called by the governor of Idaho, was well attended by delegates from this project. At a meeting in Idaho Falls on November 24, the water users in the Snake River Valley voted to ask the Reclamation Service to construct the American Falls Reservoir. Irrigation companies which are now operating propose to advance the money needed to provide the storage capacity required by them to supplement their rights.

Surveys were continued on the Minidoka North Side pumping unit. On the South Side pumping unit three small crews were engaged continuously on minor repairs to structures, cleaning laterals and canals, grubbing willows, and placing sage-brush riprap on canal banks. Twelve additional crews were also used

up to the 14th on cleaning laterals and canals, burning weeds, and grubbing willows; about 60 per cent of the system is cleaned.

A 120-ton electrically operated alfalfa feed mill at Burley and a cheese factory at Rupert were put in operation the latter part of the month. About 2,500 head of pure Herefords were shipped in from Jackson Hole to be fed on the project during the winter.—*Barry Dibble.*

#### HUNTLEY PROJECT, MONTANA.

November came in cold with 12 inches of snow on the level. This condition prevailed until the 16th, when the snow was melted by chinook winds, and good weather continued until November 25, when it turned cold and started to snow. At the close of the month there were 9 inches of snow on the ground.

On drainage work, 375 lineal feet of tile were laid, and 325 cubic yards of dirt moved; also one profile for a tentative drain was run.

At the gravity pumping plant, both pumping units were torn down for repairs, and one pumping unit was partly reassembled again.

The field crop census was completed, and the work of compiling the data at the office was begun. Work was also started on the annual project history and operation and maintenance report. Other office work was confined to routine and collection of the annual construction charges.

On and after the 17th the examiner of accounts and his bookkeeper were at the office inspecting the project books.

Snow coming in October caused a considerable acreage of sugar beets to be left in the ground, but the short period of good weather in November permitted the harvesting of most of them.

Some excellent crop yields, per acre, have been reported. The maximum yields coming to the writer's knowledge were sugar beets, 20.1 tons per acre; wheat, 62.2 bushels; oats, 100 bushels; alfalfa hay, 6 tons; potatoes, 300 bushels; barley, 60 bushels. On the other hand there were a number of poor crops on good quality land, due principally to the extremely dry and hot weather prevailing at the seed germinating period. At the close of the month there were several fields of grain that had not been thrashed.

Five committees, aggregating 15 members, representing the water users from Huntley, Osborn, Worden, Pompeys Pillar, and Ballantine districts, convened on November 1 and 8 to confer with District Counsels E. W. Burr and H. D. Padgett in regard to forming an irrigation district of the project. The joint committeemen decided in favor of forming a district, and accordingly appropriate petitions were prepared by the project office and one copy furnished each committeeman to circulate for signers.—*R. H. Fifield.*

#### MILK RIVER PROJECT, MONTANA.

Except for the period from the 17th to the 23d the weather for November was unusually severe and unfavorable for farming or construction work. Flow in the Milk River at Havre the early part of the month was 10 second-feet.

Canals were put in shape for winter and crop census data collected. Field work of surveys for Connolly Damsite, Chain Lakes Reservoir, was completed.

Contractors on small earthwork contracts attempted to proceed with the work, but did not make much progress.—*Geo. E. Stratton.*

#### ST. MARY STORAGE UNIT.

Severe weather prevailed during nearly the entire month of November, making it practically impossible to do any construction work. Although the precipitation was not great, solidly packed snow covered the ground the first half of the month, so that it was necessary to feed all range stock.

No attempt was made to operate the St. Mary Canal and the only maintenance work consisted of opening and draining canal structures and removing debris from the trash racks at Sherburne Lakes Dam.

Most of the three cars of heavy lumber was hauled from Cardston, Canada, to the site of the work at Spider Coulee flume by contract, and one car of flume steel was delivered at Cardston and unloaded.—*R. M. Snell.*

#### Prevailing crop prices at close of November, 1919.

Project.	Alfalfa hay, per ton.		Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	\$16	\$20	\$24-\$27	\$1.38	\$1.00	\$2.10
Yuma.....	18	25				
Orland.....	21	25	1.79		2.20	
Grand Valley.....	20	25	1.75	.90	1.92	\$1.00
Uncompahgre Valley	14		1.32	.72	1.92	1.50
Boise.....	14	20	1.44	1.10	1.85	1.65
King Hill.....	20	25		1.05		1.80
Minidoka.....	18	22	1.44	.96	1.93	1.35
Huntley.....						
Milk River.....	23	28	1.13	.68	2.71	2.40
Sun River.....	26	31	1.10	.90	2.73	1.80
Lower Yellowstone..	25		1.15	.90	2.80	1.50
North Platte.....	14-18		1.33	.93	2.10	1.20
Newlands.....	15	20				1.35
Carlsbad.....		28				
Rio Grande.....						
North Dakota pumping.....						
Umatilla.....	20					
Klamath.....	15	20	1.40	.93	1.95	1.80
Belle Fourche.....	20		1.50	.80	2.39	2.40
Strawberry Valley..	27	30	2.75	2.75	2.00	1.25
Okanogan.....	25					3.00
Yakima:						
Sunnyside unit..	18-23	19-22			2.05	1.75
Tieton unit.....	18-23	19-22			2.05	1.75
Shoshone.....	19	23		1.00	2.35	1.35
Indian projects:						
Blackfoot.....	30		1.11	.65	2.73	
Flathead.....	30				2.40	1.20
Fort Peck.....	30	35		.80	2.89	2.10
Riverton.....	20			1.25	1.86	1.80

#### SUN RIVER PROJECT, MONTANA.

November weather was generally cold and stormy throughout the month and very unfavorable for construction work.

No work was performed by Government forces on construction of structures in the Greenfields Division due to snow and unfavorable roads. Equipment was stored and camp closed for the season on November 5. Very little work was done by contractors on lateral excavation under advertisement No. 1905.

No work was done on the completion of the lining of Greenfields Canal. Rock riprap was placed below the wasteway structure at Elbow Coulee and gates for this structure hauled from Fairfield. Equipment was stored and camp closed on November 9.

The crew engaged on repairs to Pishkun Canal finished painting a portion of the Sun River Crossing



pipe, placed riprap below outlet of the cut and cover section, and made some repairs to concrete structures and operation road. Camp was closed on November 15 and equipment hauled and stored at Gilman.

Farmers on the project were engaged principally in marketing hay and grain. Some grain remained unthrashed at the end of the month. Hay, potatoes, and all kinds of grain suitable for stock feed increased in price during the month. Due to snow and ice in canals and laterals it was impossible to deliver the usual late run of water to fill cisterns and reservoirs for stock and domestic use. Maintenance work on the Fort Shaw unit consisted of backfilling concrete structures recently installed and placing small wooden structures on laterals. There were shipped during the month from Fort Shaw and Simms 34 cars of hay, 3 cars of potatoes, and 3 cars of cattle.—*Geo. O. Sanford.*

#### LOWER YELLOWSTONE PROJECT, MONTANA—NORTH DAKOTA.

Midwinter weather conditions, which set in during the previous month, continued during the greater part of November. A thaw during the third week melted most of the heavy snow fall of October and ranges were opened in patches. This was followed by a very severe cold spell which continued for the balance of the month. Records covering a period of 13 years show this to be the coldest November with a mean temperature  $14^{\circ}$  below normal.

Due to the unfavorable weather conditions, the fall maintenance work on the distributary system was suspended. The three drag-line excavators cleaned silt from the main canal for a distance of 1.4 miles. Severe weather and frost conditions made it necessary to take machines No. 1 and No. 3 off this work on the last day of the month. Willows and tree growth were removed from the main canal for a distance of about 2 miles. Crop reports and other annual data were obtained from the farmers during the month.

E. W. Burr met with the directors of the water users on November 17 and 18 to consider the progress made in the formation of irrigation districts. The directors were not inclined to shoulder the responsibility for entering into the contract presented and definite action has been deferred pending the result of a referendum vote which will be counted December 12.—*F. C. Youngblutt.*

#### NORTH PLATTE PROJECT, NEBRASKA—WYOMING.

November weather was unusually severe. A heavy snowstorm started on the 8th and continued until the 10th, accompanied by high winds and temperature as low as  $9^{\circ}$  below zero. About 10 inches of snow fell, drifting badly on account of the high winds and making the roads impassable for several days. The weather then moderated slowly until the 26th, when a second storm occurred, which was nearly as bad as the first and was followed by very cold weather until the end of the month. The mean temperature was the lowest on record for the month of November, being  $8.5^{\circ}$  below the normal.

**Operation.**—None of the canals was operated with the exception of the Fort Laramie Canal, which was operated as far as the wasteway at mile 25.5 to furnish water for the operation of the Lingle power plant. Considerable difficulty was encountered on account of the high winds filling the canal at the penstock gates full of tumbleweeds. Little ice trouble was experienced at the penstock gates, as the water was kept checked up to a 7-foot depth at the gates. Con-

siderable difficulty was encountered at the upper end of the canal on account of the low stage of the river and large amount of float ice entering the canal and causing obstructions which at times nearly stopped the flow.

**Maintenance.**—On the Interstate unit drag line No. 4 continued work on the Interstate Canal banks, the progress being somewhat hindered by the weather conditions. Small forces were employed on maintenance and replacement work in the three lateral districts until the storm of the 8th, since which date field work has been stopped and only routine work about camps carried on.

The bridge crew completed the replacement of bridges over the Lower Nine-mile drain on the 24th and moved to the Wild Horse drain to continue the construction of bridges on that drain.

A small crew was employed on the construction of a floating dredge to be used on the widening and bank-strengthening work on the Interstate Canal.

**Crops.**—All crops are now harvested. Some losses were experienced by potato growers on account of the early freezing weather and their inability to obtain cars for shipping.

The sugar-beet harvest has been completed, though there still remain about 10,000 tons to be delivered to the beet dumps. There was very little movement of crops on account of the weather and road conditions.

**Live stock.**—A few cattle and sheep have been brought in during the month for wintering and for fattening. Up to the end of the month a total of about 50,000 sheep, 6,500 cattle, and 500 horses had been brought in.

**Drainage.**—Repair parts of drag line No. 2 on the Interstate unit arrived and the machine was placed in operating condition, but no work was done. Drag line No. 3, after finishing the work for the Nine-mile irrigation district, was loaded and shipped to Mitchell, where it was rented to the Mitchell drainage district for cleaning and deepening the Mitchell drain.

Work was continued on the construction of the structures on the Wild Horse drain. All concrete structures and all but two timber highway bridges were completed.

On the Fort Laramie unit electric drag line No. 2 continued work on the Cherry Creek drain, working with two shifts daily. A total of 23,108 cubic yards of material was moved and 0.87 mile of drain completed. Piling were driven for two bridges over this drain.

**Construction.**—Storage unit: Preparations were made to begin work on the construction of the new north tunnel outlets at the Pathfinder Dam. A large amount of supplies and material were shipped to Casper and freighted to the dam and a Government mess was started on the 21st. The work consisted of camp reconstruction and repair work, and the construction of roads to facilitate the delivery of material as close as possible to the work.

Interstate unit: The construction of a highway bridge over the Interstate Canal at mile 23.2 was started but was stopped on account of the weather. The construction of the foundation of a five-room cottage for the use of the district counsel was begun.

Fort Laramie unit: Electric drag line No. 1 continued work on the Springer lateral, operating with two shifts daily. During the month 0.15 mile of lateral was excavated and 17,000 cubic yards of class 1 and 825 cubic yards of class 2 material were moved. This machine also moved 5,000 cubic yards of earth

in the reconstruction of 3,000 feet of the privately owned Springer ditch where it was destroyed by the construction of the Government lateral. Drag lines Nos. 3 and 5 continued work on the South Horse Creek lateral, each operating with two shifts daily. During the month 2.05 miles of lateral were completed and 70,381 cubic yards of earth moved. In connection with the removal of classified material on the South Horse Creek lateral during the month 2,200 linear feet of hooks were drilled and the following quantities of explosive used: 5,650 pounds of T. N. T., 2,125 pounds of black powder, and 355 pounds of dynamite.

Work was continued on the construction of structures on the Cherry Creek lateral system, but progress was slow on account of weather and road conditions: sixty-seven cubic yards of concrete were placed in Cherry Creek siphon No. 1 and the structure is now 80 per cent complete. Six drops, 3 road culverts, 1 turnout, and 1 weir were constructed on sublaterals.

Northport district: Work was continued by the Government forces on the excavation of schedule No. 1 of the Northport Canal and on the construction of the new permanent camp at Indian Creek.

*Summary of electric drag-line operation.*—Following is a summary of the results obtained by the operation of the four electric drag lines on the Fort Laramie unit:

	For month.	To date.
Number of 8-hour shifts.....	150	948
Miles of excavation completed.....	3.07	24.99
Total excavation, cubic yards.....	110,689	655,946
Class 2 excavation, cubic yards.....	825	55,846
Class 3 excavation, cubic yards.....	0	150
Average cubic yards per shift.....	7.37	735
Average kilowatt-hours per cubic yard.....	0.55	0.47

*Power-house operation.*—The Lingle power plant was operated with two 8-hour shifts daily. Following is the operation record for the month:

Total hours operated.....	476
Total power generated.....	121,610
Power wasted through rheostat.....	33,000
Power used by drag line No. 1.....	9,200
Power used by drag line No. 2.....	18,400
Power used by drag line No. 3.....	16,100
Power used by drag line No. 5.....	17,400
Power used by Kiowa repair shop.....	1,485
Power used by Kiowa camp (lights).....	425
Power used in transmission.....	25,300
Percentage lost in transmission.....	28
Load factor.....	34
Average load.....	256
Peak load observed.....	550
Water used through plant.....	1,770
Average flow through plant.....	45
Transmission lines in operation.....	33½ P. H. T. 8 T. H. T. 17 L. T.
Substations in operation.....	4

*Surveys, Interstate unit.*—One party has continued work on seepage investigations and has furnished lines and grades for construction work.

*Fort Laramie unit.*—Little field work could be done on account of weather and road conditions. The necessary lines and grades were furnished for the drag-line construction work and miscellaneous surveys carried on when weather permitted.

*Northport district.*—Office work was continued on the topographic surveys of the district.—*H. C. Stetson.*

#### NEWLANDS PROJECT, NEVADA.

The weather during the greater part of November was favorable for all project work. A sudden extreme

drop in temperature, with a light snow, gave indications of an early freeze-up, which will probably interfere with maintenance and other work.

On November 3 at a meeting of the board of directors of the irrigation district the project manager presented plans and estimates for operation and maintenance work for the calendar year 1920 for the consideration of the board.

On November 3 the project manager left for San Francisco to meet the chief of construction for a conference on Lake Tahoe and other project matters, returning to Fallon on November 6, accompanied by District Counsel R. M. Patrick, who had been in California in connection with Lake Tahoe work.

On November 10 Mr. Richardson went to Carson City to interview Governor Emmett D. Boyle.

On November 18 the project manager and the district counsel attended a meeting of the board of directors of the Truckee-Carson Irrigation District for the discussion of matters relating to project drainage and a contract for the accomplishment of the same. On November 19 Project Manager J. F. Richardson, as the representative of Nevada, accompanied by Edmund Dietz, president of the board of directors Truckee-Carson Irrigation District, C. E. Coe, A. D. Drumm, and W. K. Davis left for Salt Lake to attend the western irrigation and reclamation conference held in that city on November 21 and 22.

On November 25 the project manager called on Governor E. D. Boyle in Carson City, reporting upon the irrigation conference.

*Construction work and surveys.*—Enlargement of the S2 lateral was in progress the entire month with drag-line excavator No. 2 operating three shifts. Several lateral timber structures were installed or replaced in connection with this work.

A small amount of work was done in connection with the erection of the new project shops and yards, which were practically completed except for the installation of the spur track.

Contract work on the Schaffer lateral, one-fourth mile in length, was completed on November 10.

Three Holt tractors, owned by the service, were rented to individuals for private land leveling work during the month.

Farm unit and irrigable area surveys were made covering about 1,050 acres for the purpose of placing new lands on the farm unit plats.

Surveys were made for obtaining rights of way for the construction of the Langford, Renick, and Brown laterals. Surveys as needed were made in connection with the S2 lateral enlargement.

*Settlement.*—Public notice dated November 10, 1919, was approved for the placing of 938 acres of public land and 63 acres of private land on the farm-unit plats. All of these lands will be filed upon immediately, as applications for them have been received, accompanied by initial water-right payments.

A large number of inquiries were received regarding project lands, and 12 farm units not yet on the plats were selected by prospective settlers, who deposited the initial payments and requested that the lands be opened to entry. Three homestead filings covering 223 acres and 5 private land water-right applications for 263 acres were accepted during the month.

*Water supply and use.*—Lahontan reservoir outlet gates were closed the entire month. Truckee River flow was practically all diverted into the Truckee Canal for storage in Lahontan reservoir and operation of the Lahontan power plant.



The surface of Lake Tahoe continued to fall rapidly, the elevation of 6,225.10 feet at the end of the month being, with the exception of the year 1913, the lowest on record during the last 20 years. Flow from Lake Tahoe was limited to that necessary for the maintenance of power requirements along the Truckee River.

*Operation and maintenance.*—The distribution system was not operated for irrigation during November.

About  $3\frac{1}{4}$  miles of laterals were cleaned during the month, in addition to which brush and trees were removed from about 6 miles of canals and laterals. Six minor timber structures were repaired in the Grimes, Smart, and Soda Lake districts. One 8-foot check structure in the C4 lateral was remodeled and moved.

Practically all of the Government stock was occupied on operation and maintenance and construction work.

Freezing of the ground during the last week of November practically ended ditch-cleaning work for this season.—*D. S. Stuver.*

#### CARLSBAD PROJECT, NEW MEXICO.

Water was in the canal for about a week during the latter part of November. A very small amount of water was used on late seeding of alfalfa. No maintenance work was done except by a small force at Lake McMillan on the east embankment. Two ditch riders were employed taking crop census; the rest of the force were on leave.

The weather was cloudy and wet part of the month, and field operation on the farms was delayed somewhat as a result. The first frost occurred on November 3.

The run-off of the river at the Dayton station has averaged about 370 acre-feet during the month. The total run-off was about 11,000 acre-feet, which was very much lower than the previous month.

Labor has been scarce and has been used largely on the farms in the cotton fields. It has been difficult to secure enough pickers.

An unusually large number of sales of project lands have been made during the past month to local people, at prices from 25 to 60 per cent above prices asked for lands in 1917. In many cases substantial improvements are being made on newly purchased farms.

Work on farms has been confined principally to picking cotton and hauling to the gin. Up to the end of the month 3,333 bales of cotton had been ginned. It is estimated that about 45 per cent of the crop is still to be ginned. Cotton sold readily at prices ranging from 40 cents per pound for short to 62 cents for long staple cotton. Cotton seed sold for about \$63 per ton, except planting seed, which sold for from \$120 to \$150 per ton. About 1,400 bales of cotton were shipped from the project during the month. The Pecos Water Users' Association collected \$11,923 during the month, principally construction charge for 1919. Practically all delinquent charges have been collected. Twenty carloads of sheep and 41 of cattle were shipped during the month.—*L. E. Foster.*

#### NORTH DAKOTA PUMPING PROJECT.

Weather conditions were very bad, with the lowest mean temperature for November, except once, for a period of 44 years. To add to the inconvenience of low temperature the heavy fall of snow which occurred late in October remained on the ground. The precipitation for the month was 3.8 inches of snow-fall, equivalent to 0.46 inch of moisture. This was

0.14 inch below normal and makes an accumulated deficiency of 1.24 inches for the year. The highest temperature was 48°, lowest 20° below zero, average 16°.

There were no irrigation operations. Maintenance work consisted of machinery and boiler furnace repairs and necessary repairs to power-plant buildings.

The revolving field of one Curtis turbine was reinstalled and the turbine handled the commercial power load satisfactorily. The field of the 500-kilowatt turbine was shipped to the factory for repairs, in preparation for the next irrigation season.

The power plant was operated for the commercial power contract; 105,311 kilowatt-hours of electrical energy were delivered to the switchboard of the city of Williston. This was an increase of 5,961 kilowatt-hours over last month and 12,386 kilowatt-hours over the same month of last year.

In the coal mine 915 tons of coal were mined.

On October 31 all working places were cleaned up in the coal mine, as the district president of the United Mine Workers of America had announced that all miners would be included in the strike; but before 8 a. m., November 1, the local miners' union received orders that all miners would go out "except those in the Government mine." A month's supply of coal had been accumulated in storage in anticipation of the strike and is now carried on hand.—*Wm. S. Arthur.*

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

Warm weather prevailed during November, with precipitation 0.44 inch above normal.

The inflow into the Elephant Butte Reservoir was 39,000 acre-feet during the month, an average flow of 650 second-feet per day.

Water for irrigation purposes was released from Elephant Butte Reservoir at 8 a. m. on November 1, and the gates closed at 8 a. m. on the 12th. A large acreage of grain and alfalfa was irrigated during this period. The next run of water will be January 1.

Cotton growers are still picking cotton, and the yield on one tract of 700 acres will average  $1\frac{1}{2}$  bales per acre. It is expected that 10,000 acres will be planted to cotton during 1920.

The project is 71 per cent complete as to area irrigation and 74 per cent complete as to expenditures.

Construction work during the month was confined almost entirely to drainage work. Three  $1\frac{1}{2}$ -yard Bucyrus drag lines operated two shifts, and three  $1\frac{1}{2}$ -yard Bucyrus and one  $2\frac{1}{2}$ -yard Monaghan drag lines were operated one shift each. The contract machine was operated. The total excavation amounted to 252,866 cubic yards in 4 miles of drains. Two machines, which were shut down on account of the shortage of funds, resumed operation upon the advancement of \$60,000 by the Elephant Butte irrigation district.

A change of policy was considered practicable in regard to farm unit plats, it being decided that official farm unit plats were not necessary for the private lands contracted for under the irrigation districts.

All canal and lateral cleaning is to be done by contract during the month of December. Specifications and advertisements were prepared and issued for cleaning 26 canals and laterals. Proposals were received November 22 and 29 for work in this connection, amounting to approximately \$40,000.

The consulting board of engineers on the Highline Canal completed their work on the project on November 7. Mr. Munn and Mr. Pease returned to Denver, and Mr. Henny with Mr. Walter, accompanied by Mr. Gaylord, proceeded to the Lower Rio Grande project

for a board meeting there. Mr. Burkholder proceeded to Yuma. The board expected to complete their report on the Highline Canal in the Denver office.

The chief of construction arrived in El Paso on the 12th and spent two days on the project. Mr. Bien, assistant to the director, also visited the project.

Reclamation matters were discussed with representatives of the irrigation districts prior to their leaving for the Salt Lake irrigation convention.—*L. M. Lawson.*

#### UMATILLA PROJECT, OREGON.

November has been a month of unusually low temperatures. The mean temperature averaged over three degrees lower than the normal for the last 12 years. Precipitation was heavy, being almost three-quarters of an inch higher than the average for 11 years. Snow fell on the closing days. A storm beginning with a high wind from the northeast on the 26th, followed by sleet and snow, continued until the close of the month.

*Farming operations.*—Owing to the cold weather which prevailed during the latter part of the month farm operations were limited. Some land was cleared and several baling crews were engaged in baling hay throughout the month. The apple-packing plant had practically completed its work at the close of the month. Due to the sudden drop in temperature some of the orchards sustained some crop losses because of inadequate storage facilities for the apples which were waiting to be packed. During the month 79 cars of baled and chopped alfalfa hay, 16 cars of apples, and 2 cars of hogs and mixed stock were shipped; 1½ tons of alfalfa seed, and over 7½ tons of honey were also marketed.

*Labor conditions.*—Due to the fact that operations are considerably curtailed on the project, labor conditions were easy.

*Operation and maintenance.*—The feed canal was operated throughout the month diverting from 23 to 274 second-feet. Prior to November 11 diversions were for delivery to the Echo Mills. On that date diversions for storage for the season began. Due to heavy rains over the drainage basin of the Umatilla River an earlier flow of water began in the river than in any previous year. Water for diversion was available on November 1, but due to the failure of the highway-bridge force to complete the installation of bridge piers and abutments, it was not possible to divert water for storage until the 11th. During the remainder of the month the heaviest total diversion was obtained for the month of November since the operation system began. A total of 10,753 acre-feet was diverted from the Umatilla River, of which 6,533 acre-feet were delivered to the reservoir. The total storage at the end of November was 7,750 acre-feet. Operation conditions were on the whole satisfactory. Some difficulty is being had in retaining a night man at the diversion gates due to inadequate housing facilities. One serious leak occurred below the barrel flume near Echo, and some sloughing along the outlet chute from the feed canal to the reservoir occurred. Maintenance work for the month consisted chiefly in repairs to structures, protection of river bank below the feed canal diversion gates, and miscellaneous work occasioned by operation on the feed canal. Some work was done also on the west side, aside from regular maintenance, on the sluiceways preparatory to sluicing operations during the month of December.

#### Crop report, North Dakota pumping project, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.	
Alfalfa hay.....	173	Ton.....	238.50	1.38	\$30.00	\$7,155	\$41.40	
Alfalfa seed.....	1.5	Bushel.....	3.75	2.50	18.00	68	45.00	
Apples.....	.33	Pound.....	600	1,818	.05	30	90.90	
Barley.....	16	Bushel.....	300	18.75	1.01	303	18.94	
Beans.....	1.5	do.....	19.50	13	7.00	137	91.00	
Beets, sugar.....	1.87	Ton.....	13	6.95	10.00	139	69.50	
Clover hay.....	2	do.....	6	3	30.00	180	90.00	
Corn.....	15.5	Bushel.....	590	38.20	1.50	885	57.30	
Corn fodder.....	88.5	Ton.....	487.75	5.51	20.00	9,755	110.20	
Flax.....	36	Bushel.....	90	2.50	4.35	392	10.88	
Garden.....	47.3	Acre.....				4,602	97.30	
Hay.....	558	Ton.....	581.50	1.04	25.00	14,538	26.00	
Millet seed.....	4.5	Bushel.....	86	19.11	3.60	310	68.80	
Oats.....	254.5	do.....	6,384	25.08	.73	4,660	18.31	
Onions.....	3.25	do.....	13	4	6.00	78	24.00	
Pasture.....	484.35	Acre.....				3,632	7.50	
Peas.....	.15	Bushel.....	5	33.30	6.00	30	199.80	
Potatoes.....	99.25	do.....	5,327	53.67	2.00	10,654	107.34	
Rye.....	15	do.....	41	2.73	1.10	45	3.00	
Wheat.....	722	do.....	4,578	6.34	2.71	12,406	17.18	
Less duplicated areas.....	154.5							
Total cropped acreage.....	2,370		Total and average.....			69,990	29.53	
			Areas.			Acres.	Farms.	Per cent of project.
Irrigated, no crop:			Irrigable area farms reported.....			3,867	76	51
Alfalfa.....	262		Irrigated area farms reported.....			2,446	76	32
Miscellaneous.....	26		Cropped area farms reported.....			2,370	76	31
Less duplicated areas.....	212							
Total irrigated acreage.....	2,446							



**Construction.**—The only construction during the month on the east side was the installation of four turnouts and measuring boxes, and the installation of three catch basins, involving the laying of three 20-inch and eleven 16-inch pipes and placing 4 cubic yards of concrete on supplemental district No. 29. On the west side lateral No. 5 was completed by the installation of one metal gate. In the main canal, the placing of eighteen 16-foot pipe through the bank, and the placing of 1 cubic yard of concrete in a measuring basin.

**General.**—The main interest of the project during the month has been centered on the three big livestock shows of the Northwest. During the month shows were held at Portland, Oreg., Spokane, Wash., and Lewiston, Idaho. The Oregon State Fair was also held at Salem, Oreg. Project breeders of purebred hogs showed at all these shows except that at Spokane. At the Oregon State Fair Messrs. Adams & Mason, showing registered Duroc Jersey swine, won the first litter prize, and also had the junior champion boar and sow. At the Lewiston show Messrs. Adams & Mason also exhibited their Orion Sensation litter and again won first prize by winning first junior sow and first litter in the Northwest roundup futurity, having the only litter in which all the pigs were in the money. A total of 12 ribbons were won and over \$300 in cash prizes. Messrs. Adams & Mason in the three shows in which they have exhibited this fall, the Oregon State Fair, the Lewiston Live Stock Show, and the Hermiston Hog and Dairy Show, have won 31 ribbons and over \$500 in cash prizes. The showing at Lewiston show was especially gratifying, since this is said to have been the largest swine show ever held west of Denver. At the Pacific International Show at Portland the project was represented by George Strohm, who secured first prize on a carload lot of light Duroc Jersey hogs. Mr. Strohm not only was awarded a first prize of \$250, but received 4 cents a pound above the market for his stuff, realizing approximately \$700 by showing his hogs at the show. The showing of Mr. Strohm was especially gratifying because the results he has obtained are those of a practical pork producer who has been consistently building up his herd for a number of years. It is doubtful if there is a larger producer in the Northwest who is raising as high a grade of stuff as Mr. Strohm.—*Maurice D. Scroggs.*

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

November was generally favorable for outdoor work, considering the lateness of the season. There were several light snowstorms; the aggregate precipitation for the month being 0.48 inch; the average precipitation, based on a 10-year record, is 2.43 inches.

Thrashing is entirely completed, also the gathering of grain hay along the north shore of Tule Lake. There was a somewhat less demand for labor, due largely to the closing down of some lumber camps. The average price of labor was about \$5 per day.

No water was used for irrigation. During the first part of the month a little stock water was run in the vicinity of Merrill and Malin.

Very little maintenance work was done. Efforts were made to concentrate as much as possible on replacing the timber lining in canal C with concrete. An insufficient supply of labor made progress of the work slow. Three hundred and seventy-four cubic yards of rock and 264 cubic yards of sand were delivered and about 1,220 linear feet of canal were lined.

The work done involved the placing of about 3,860 square yards of 3-inch concrete lining, equivalent to 326 cubic yards of concrete.

Work continued throughout the month on the construction of canals for the Enterprise irrigation district. A California firm purchased about 1,000 acres of tule land near the northerly end of Lower Klamath Lake for the purpose of growing potatoes.

Between October 13 and 16, District Counsel H. L. Holgate visited the project, and E. C. La Rue, of the United States Geological Survey, between the 21st and 23d.—*Herbert D. Newell.*

#### Project weather during November, 1919.

Project.	Station.	Temperature, °F.			Precipitation (inches).
		Maximum.	Minimum.	Mean.	
Salt River.....	Phoenix, Ariz.....	84	29	56.6	2.38
Yuma.....	Yuma, Ariz.....	84	31	60	.28
Orland.....	Orland, Calif.....	81	32	52.1	.19
Grand Valley.....	Grand Junction, Colo.....	63	12	37	1.89
Uncompahgre Valley.....	Montrose, Colo.....	63	7	35	1.98
Boise.....	Boise, Idaho.....	58	8	37	2.34
King Hill.....	Glenns Ferry, Idaho.....	52	-2	31	2.26
Minidoka.....	Burley, Idaho.....	66	-11	33.8	1.02
Huntley.....	Ballantine.....	60	-16	25.7	.65
Milk River.....	Malta, Mont.....	54	-21	18.6	.47
St. Mary storage.....	Near Babb, Mont.....	68	-16	25	.64
Sun River.....	Fort Shaw, Mont.....	60	-12	29.5	.20
Lower Yellowstone.....	Savage, Mont.....	46	-14	17.2	.37
North Platte.....	Lake Minatare, Nebr.....	60	-4	29	1.00
Newlands.....	Fallon, Nev.....	71	0	35.7	.20
Carlsbad.....	Carlsbad, N. Mex.....	80	20	.....	.85
Rio Grande.....	El Paso, Tex.....	76	28	52.4	.93
North Dakota pumping.....	Williston, N. Dak.....	48	-20	16	.46
Umatilla.....	Hermiston, Oreg.....	65	3	39.2	1.73
Klamath.....	Klamath Falls, Oreg.....	58	7	36.6	.48
Belle Fourche.....	Orman, S. Dak.....	58	-10	25.3	.82
Strawberry Valley.....	Provo, Utah.....	69	10	37	1.36
Okanagan.....	Omak, Wash.....	56	13	34.7	.68
Yakima.....	.....	.....	.....	.....	.....
Sunnyside unit.....	Sunnyside, Wash.....	69	7	39.8	.80
Tifton unit.....	Cawiche, Wash.....	64	11	36.9	.49
Shoshone.....	Powell, Wyo.....	52	-15	20.8	T.
Indian projects:	.....	.....	.....	.....	.....
Blackfoot.....	Browning, Mont.....	52	-16	19	.35
Flathead.....	St. Ignatius, Mont.....	63	-15	.....	1.44
Fort Peck.....	Poplar, Mont.....	47	-19	13.6	.04
Riverton.....	Pavillion, Wyo.....	.....	.....	.....	.....

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

The weather for November was unseasonably severe; the storm in the latter part of October extended over into the early part of November, leaving the roads in extremely bad condition. On the 8th and 9th 8 inches of snow fell, making about three-fourths inch of precipitation. This storm was immediately followed by cold weather, which put all outdoor work at a standstill and caused farmers to begin feeding heavily. On the 25th another light snow occurred followed by below-zero weather for several nights. The maximum wind velocity was 50 miles per hour.

Canal operation consisted in running water from the Belle Fourche River through the diversion canal to the reservoir. The full flow of the river was carried to the reservoir.

Maintenance work was practically at a standstill. The extremely bad roads of the month before continued throughout November, and it was impracticable to attempt any maintenance work of importance. A small amount of structure work was done in the Vale district in rebuilding the Rua flume 5 miles east of Vale. This work was completed during the month.

Storage in the Belle Fourche Reservoir at the end of the month was 90,250 acre-feet. On account of the severe weather in October and November it has been impracticable to plan any extensive maintenance work for the winter. The outline given in last month's report will be followed as soon as weather conditions will permit.

The force employed consisted of the project manager, irrigation manager, 4 clerks, 1 timekeeper, 1 water master, 2 general foremen, 1 gate tender, and an average of 9 laborers.

Survey work on the Willow Creek extension was discontinued in October, but the instrument man was retained for office work, which was prosecuted until the 21st of the month, when Mr. Stinson, who was in charge of this work, resigned and went to Texas to take up highway construction.

Beets were the only crop not harvested in fairly good condition before winter weather set in. There is a large quantity of beets in the ground or in the field, many of which probably never will get to market; a small amount of grain in the upper portion of the project has not yet been thrashed and very little hay has been baled for shipment. This, however, is considered fortunate since it is probable that all hay on the project will be required for stock in the immediate vicinity. Alfalfa hay is now selling at \$20 in the stack, and appears to be very scarce.

Range stock especially has been hard hit by the early storms and thousands of head are being held for shipment as soon as cars can be secured. During the recent storms several hundred head of sheep and considerable cattle perished on account of the cold and shortage of feed. The dry season in Montana, Wyoming, and the western Dakotas has caused such a rush of unfed cattle to market that the price is next to nothing, range stock being only 5 or 6 cents on the Omaha market, while first class fat cattle, grain fed, bring practically three times that amount.

Hogs on the project have been well taken care of and many droves have gone to market. The price was not so good as many had hoped for, but it is believed that a fair profit was realized in most cases.

There were no filings on Government land during the month, in fact only two units remain subject to entry. One or two transfers of private land at good figures were reported during the month.

Henry A. Cox, district counsel, arrived on the project on November 21 and left on the 24th, after going over various matters with the chief clerk and project manager.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

The weather during November was generally cold, with considerable rain and snow during the first part. At the East Portal of the Strawberry Tunnel the precipitation was 1.01 inches; maximum temperature, 52°; minimum, 7° below zero; mean, 23.8°; snowfall, 14 inches. The elevation of the reservoir at the end of the month was 7546.1. The weather conditions were generally unfavorable both for farming operations and construction work.

Both labor and teams were very scarce, \$6 per day being paid for single hand and \$1.25 per hour for driver with team used in connection with harvesting beets.

Power was delivered to all parties having contracts without serious interruption.

A construction force was organized and sent to the West Portal of the Strawberry Tunnel and work com-

menced on the repairs to concrete lining in the tunnel. It was necessary to do considerable work on the tunnel road in order to make it passable for trucks and teams hauling supplies to the construction force.

The special fiscal agent and one clerk spent eight days in the various towns on the project collecting operation and maintenance charges. Approximately 51 per cent of the construction and operation and maintenance charges due have been collected.

Data are being secured for the annual crop report; results so far show satisfactory yields for almost all crops.

The water-wheel driving generator No. 1 in the power plant was overhauled and repairs made to the thrust bearings.

Negotiations were continued for the sale of 1,200 acre-feet of water to Payson city.

During the present year 126 new houses have been built on the project and large additions and improvements made to 75 others. At Payson the Strawberry High Line Canal Co. has an office building, almost complete, costing approximately \$7,000. Alfalfa mills have been constructed at both Payson and Spanish Fork.—*J. L. Lytel.*

#### OKANOGAN PROJECT, WASHINGTON.

From the 1st of November until the 11th fair weather prevailed and allowed the completion of the harvesting of the apple crop. Extremely cold weather occurred for a few days after that date, which stopped all packing and hauling of apples. During the month only a small portion of the apple crop was shipped because the shippers found it impossible to secure refrigerator cars in which to make shipment. The prices for apples remained the same until the end of the month, when an extreme drop occurred in the early varieties of apples. The price of alfalfa remained at \$25 per ton in the stack. The regular routine office work was carried on during the month with a small amount of maintenance work necessary to care for snow water during the winter. The major portion of the crop report was taken and will be completed during the next month.—*Calvin Casteel.*

#### SALMON LAKE DAM.

The weather during November was unusually cold for this season of the year and considerably hindered construction work. The snow fall during the month was light, even in the higher mountains.

The heavy demand for labor to care for the apple crop extended well into the month. At the end of the month construction labor was more plentiful.

Embankment construction on the Salmon Lake Dam was continued, using a steam shovel to load tractor-drawn dump wagons; 8,500 cubic yards of earth material and 900 cubic yards of riprap were placed during the month. Due to unfavorable weather conditions, embankment work was suspended at the end of November.

The excavation of the feeder canal from the North Fork of Salmon Creek to Salmon Lake Reservoir was started early in November and at the end of the month was approximately 75 per cent completed.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for November was slightly below normal, with a predominance of cloudy weather, there being only 6 clear days. The lowest



temperature of 7° was on the 27th. Snow fell on November 3 and 29.

*Operation and maintenance—Sunnyside unit.*—The irrigation season closed on October 30, but a diversion of 75 second-feet was maintained up to November 18 to supply necessary water for operation of the Prosser pumping plant to deliver water needed in connection with concrete lining of the Prosser Irrigation District laterals, and for operation of the sugar factory at Sunnyside. Maintenance consisted of removal of weeds, plowing of berms, and sloping preparatory to riprapping.

*Tieton unit.*—The fall program of maintenance and betterment work was prosecuted throughout the month, consisting of cleaning silt from main laterals with a force of 14 men and 12 teams under the direction of the ditch riders; repairing and replacing small pipe lines, flumes, and other minor structures on sublaterals, this work being about 90 per cent completed on the 26th, when it was stopped in preparation for the fall run of cistern water, which started on the 30th. The work of rebuilding 6 miles of the Bumping Lake telephone line was completed on the 17th.

*Construction.*—The work of rebuilding the Tieton Tunnel transition was prosecuted, the pouring of concrete in the new transition being completed on the 28th. Preparations for plaster lining the bottom of the section in this tunnel were undertaken, consisting of chiseling the bottom of the section which was finished on the 20th. Similar work was underway on the 2,000-foot section of open channel at Station 350. Weather conditions somewhat hampered progress.

The work of lining with concrete the laterals of the Prosser Irrigation District was completed on November 19. This completes the construction work underway on the Sunnyside unit. Two hundred and thirty-three cubic yards of concrete lining were placed during the month, using 349 barrels of cement.

*Investigation and surveys for new units—Kennewick unit.*—A field party of 8 men was engaged on location work. Work accomplished consisted of 7½ miles of main canal location, 3¼ miles of spillway location, 12 square miles of sectionizing, and 2,000 acres of topography. An average force of 5 men was employed in the office on platting of topography, preparation of plans for power canal and main canal structures, as well as plans for diversion dam. Data were also prepared and forwarded to Denver for preparation in that office of plans for the Chandler pumping plant for the Kennewick unit.

The project manager attended the western reclamation conference, called by Governor Davis, of Idaho, and held at Salt Lake City on November 21 and 22.—*R. K. Tiffany.*

#### SHOSHONE PROJECT, WYOMING.

November weather was cold and generally clear, although there was heavy snowfall in the mountains and north into Montana. Precipitation was a trace only. The minimum temperature was 15° on the night of the 26th. The unseasonable weather produced a heavy draft on the local supplies of coal, so that all coal-burning excavating machinery on the project was shut down and Government coal stocks shared with the local people on orders secured from the fuel administrator.

*Water supply.*—The inflow into Shoshone Reservoir varied from 300 to 425 second-feet with a total accretion of 23,206 acre-feet. The outflow for the

month was 33,680 acre-feet. The balanced valves were closed during the month, the outflow going through the 42-inch opening.

*Operation and maintenance.*—No water was delivered during the month. In spite of adverse weather conditions considerable maintenance work was accomplished, particularly on structure work and protection of eroded canal banks. Frozen ground prevented the Monighan drag line from doing any effective work on the cleaning of the Frannie Canal and this work was shut down for the winter on November 14 after finishing about 2 per cent of this work. A break in closed drain K occurred the first part of the month, caused by settlement of tile and supporting ladders, but was repaired without much difficulty.

*Crops.*—There is still a small amount of the cereal crop to be thrashed. Freezing of the ground delayed somewhat the harvesting of beets. Some of the third cutting of alfalfa was caught by the October snowstorms and not stacked until late in November. Cereal crops will average very light in yield. The alfalfa crop is the heaviest in the history of the project. Beet yields are above the average; potatoes with a few exceptions are below the average. The following shipments were made during the month: Hay, 195 cars; alfalfa, meal, 29; wheat, 7; oats, 2; potatoes, 1; beets, 33; clover seed, 1; mixed seed, 1; honey, 2. The Powell Creamery ceased making butter and is now used as a cream station, shipping to outside factories. Live stock shipments were as follows: Sheep, 6 cars; cattle, 3; hogs, 5.

*Labor.*—Most of the labor employed was secured locally, and there was no difficulty in maintaining crews, but high wages still prevailed.

*Construction.*—Little was accomplished during the month on the extensions of the lateral system on the Frannie Division. Contractors on the Frannie Canal had to close down work for the season with their work about 91 per cent completed. Government forces established a new camp at Frannie, dismantled the Loop Camp and unloaded several cars of lumber to be used for third unit structures. Fair progress was made on completion of the D-23 system for delivering in 1920.

*Drainage.*—The Lidgerwood drag line moved from the upper end of drain 26 back to station 75 and began excavation of drain 26-7, a branch which will act as an intercepting drain below lateral B. Work was shut down November 8 on account of coal shortage. The Austin trencher excavated 950 feet at the lower end of closed drain Y, which brought the upper end of the drain into a heavy water bearing area largely in sand. On account of freezing ground and shortage of funds work was suspended November 19. The tapping of this area with the portion of the drain completed will lower the water plane and make the spring resumption of work at this point less expensive. Engineer J. R. Iakisch left Powell November 2 for an inspection trip of drainage work on the Huntley, North Platte, and Grand Valley projects, returning the 15th.

*Field and office engineering.*—Two parties were in the field during the month, one in the Garland Division, on drainage investigations and reconnaissance of extensions of the Hart Mountain Canal, and the other in the Frannie Division on right of way surveys for the Frannie Canal, earthwork lines and grades and farm unit surveys in the third unit. The Powell office force was largely engaged on maps and data for the proposed irrigation district and platting

of drainage investigation results. The Deaver office force prepared eighth unit farm unit plats and right of way drawings and descriptions for the Fran-  
nie Canal.

*Water users' association.*—Under arrangements made by the board of directors a series of 13 meetings were held at various points on the project November 3 to 6, at which there was presented to the water users by District Counsels Burr, Egleston, and Padgett the organization plan of an irrigation district. Bad weather and roads cut down attendance at the meetings, but a fair start was made in securing signatures to petitions for organization.—A. H. Ayers.

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

The weather during the entire month of November was unsettled and mostly unseasonably cold. During the first half of the month, the ground was covered with very compact and crusted snow so that range stock could not get what little grass was left on the range.

Scarcely any construction work was accomplished. A small crew located on the Fisher system was moved to the Two Medicine Canal the first of the month to complete two cross-drainage culverts, but it was found impossible to do the work and the crew was laid off, and the camp closed for the winter. Work with the drag-line excavator on the enlargement of the Two Medicine Canal was discontinued the first of the month.

None of the systems were operated and the only operation and maintenance work consisted of taking crop census, and making preparation for winter.

The only farm work consisted of feeding stock and hauling hay and grain. Large shipments of range stock were made, both to winter pastures and to market.—R. M. Snell.

##### FLATHEAD PROJECT, MONTANA.

November weather conditions have been as good as could be expected for the season of the year. There have been two cold periods, from the 11th to the 13th and from the 26th to the end of the month. Labor is plentiful.

*Construction.*—Good progress was made on the McDonald Lake Dam during the month; 37,000 cubic yards of embankment were placed. The placing of 32 cubic yards of concrete completed the gate tower for the present development. A small amount of work was done on the excavation for the spillway structure.

On the Mission A lateral system lateral excavation was suspended on the 11th. A small crew was continued on the excavation for Ashley Creek wasteway structure, on the construction of bridges and gates, and on some additional work at the Mission Creek headworks to prevent danger of flood flow getting into the canal.

On the Pablo by-pass canal the Monighan drag line moved 8,000 cubic yards of material in the enlargement of the canal.

Six thousand eight hundred cubic yards of material were moved on the Polson A lateral. The work is now in the timber on steep side-hill location. On the Pablo lateral 37AA enlargement 4,200 cubic yards of material were moved before the 10th of the month, when the work was discontinued. The laterals are practically complete now except for structures.

On the Camas Division construction work was stopped on the 29th, with very little work remaining to be done on the lateral system other than the placing of weir crests and gauges.

*Operation and maintenance.*—Small crews were employed in cleaning laterals and making minor repairs to structures.—F. T. Crowe.

##### FORT PECK PROJECT, MONTANA.

Cold, severe weather continued through the month of November. The precipitation was light. There were only 7 days when the temperature was above freezing, and the average temperature was about 20° below normal. There is still considerable snow on the ground and it has been impossible to thrash the large acreage of flax still on the ground.

All local labor has been employed mining coal in the local lignite mines, and hauling hay for cattle. It has been necessary to feed the range stock the greater part of the month of November.

No construction work was done on Big Muddy Canals during November. The equipment was stored at the camp and the Government stock taken to Poplar River camp for the winter. Work was continued at Big Porcupine storage dam and the greater part of the concrete placed in the outlet structure. The drainage trench was about half completed. About 70 per cent of the material was placed in the fore apron.

On account of freezing weather, it was impossible to continue the concrete work on Little Porcupine Dike. The equipment was stored for the winter.

No maintenance work was done during the month.

The supply of forage, following 3 years of drought, is very low and the condition of the live stock is serious.—R. M. Conner.

##### RIVERTON PROJECT, WYOMING.

The weather during November was unusually cold and stormy. There was a considerable amount of snow on the ground throughout the month, making working conditions very unfavorable. The roads were very bad, being at times practically impassable.

The unloading of the two Bucyrus dragline excavators was completed, and they were equipped with water-heating systems and otherwise prepared for working under winter conditions. They started moving from Riverton to the Wyoming Canal at the end of the month. The building of a construction camp for this work has been in progress.

Purchase orders have been placed for the material for a telephone line from Riverton to Diversion Dam.

Topographic surveys have been continued by five parties. Progress has been slow, owing to unfavorable weather and transportation conditions.

Two 2-ton White trucks have been received and have been started hauling materials and supplies to the Wyoming Canal.—H. D. Comstock.

##### GENERAL OFFICES.

*Washington office.*—During the first half of November the office was in charge of the director. On November 17, in company with the statistician, he left for the West, attending the irrigation conference in Salt Lake City, November 21 and 22, and returning to the office, in company with Mr. Bien, on December 1. During his absence the office was in charge of Mr. Hamele as acting director.

(Continued on page 46.)



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

### Monthly Progress Reports.

(Continued from page 45.)

Mr. Cory has continued his work in connection with soldier-settlement legislation.

Judge King returned from his field trip on November 24.

Visitors to the office included T. E. Scaife, circle engineer, irrigation department, Cape Town, South Africa; F. C. Adams, president of the Canyon Power Co., Nevada; Mr. Matthews, attorney for the city of Los Angeles; F. C. Stevens, of the West Side Irrigating Co., Yakima Valley, Wash.; Prof. C. F. Shaw, University of California; Mr. Tapscott, of the Iron Canyon project, California; A. D. Flinn, secretary, engineering council; R. L. Humphery, consulting engineer, Philadelphia; Col. Scheidenhelm, consulting engineer, New York; E. S. Taylor, former district counsel, now an attorney in San Francisco; and Mr. Rossborough, vice president of the California & Oregon Power Co.

*Denver office.*—The chief of construction was in the field at the beginning of November and during the month visited the Iron Canyon, Warners Ranch, Yuma, and Rio Grande projects, returning to Denver on the 16th. On the 19th he left for the irrigation conference at Salt Lake City, followed by a reclamation conference at Idaho Falls, Idaho, returning to Denver on the 24th. On November 2 Assistant Chief of Construction R. F. Walter left for the Rio Grande project as a member of the board of engineers to report on the Lower Rio Grande project investigations. He returned on November 21. Assistant Chief of Construction Chas. P. Williams was in the Denver office during the entire month. Official visitors included the director, chief counsel, and Messrs. M. Bien, A. Weiss, B. E. Hayden, D. C. Henny, W. R. Alexander, J. R. Iakisch, and H. D. Padgett.—*F. E. Weymouth.*

### C. A. LYMAN AUTOMOBILE VICTIM.

Mr. C. A. Lyman, chief of the repayment accounts section, Washington office, while riding home on his bicycle on November 11, was knocked down by an automobile and seriously injured. In addition to shock and numerous cuts and bruises, the muscles of one arm and shoulder were badly torn. No bones were broken. The cause of the accident is not known.

Mr. Lyman was rushed to a hospital and some days later was taken to his home in Washington, D. C. It will probably be several weeks before he will be able to resume his work at the office.

### BOOK REVIEW.

EIGHTEENTH ANNUAL REPORT OF THE U. S. RECLAMATION SERVICE, 1918-19; 6 BY 9 INCHES; 360 PAGES.

The annual report of the Reclamation Service for the fiscal year ended June 30, 1919, is now available for distribution.

The report consists of a discussion of irrigation results in general, a major portion devoted to a more detailed description of the work during the year on individual projects, including secondary and Indian projects, and an appendix.

Director Davis states in the introduction that "the national reclamation policy has resulted in an annual crop production of \$100,000,000 or over from lands which a short time ago returned nothing." To it, he says, must be attributed also the establishment of more than 200,000 people in prosperous and contented homes on the land and an equal number in the cities, towns, and villages which are affected by this agricultural development. Mr. Davis points out that with millions of acres of equally favorable land awaiting development and thousands of citizens clamoring for farms, it is most important that a liberal policy in providing funds to construct the necessary works should be followed by Congress.

"The demand of the soldiers for opportunities to acquire land overshadows everything in connection with settlement work, but it will not be a wise policy to overlook the very urgent and increasing call for similar opportunities from citizens who were unable to wear the colors. Every consideration of good policy that can be advanced stresses the need of increasing greatly the acreage for settlers on all public land projects as well as the taking up of new projects without delay."

The report is an unvarnished tale of achievement that should make every water user feel proud of the organization with which he is associated in the great work of home-making in the desert.

As long as the limited supply lasts, copies may be secured by writing to the chief clerk, U. S. Reclamation Service, Washington, D. C.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

HON. FRANKLIN KNIGHT LANE, Secretary of the Interior.  
 ALEXANDER T. VOGELSONG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFE, Solicitor for the Interior Department.  
 JOHN W. HALLOWELL, Assistant to the Secretary.  
 HERBERT KAUFMAN, Special Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.  
 Brig. Gen. WILLIAM L. MARSHALL, United States Army, retired, consulting engineer to the Secretary.  
 ARTHUR POWELL DAVIS, Director and Chief Engineer of the Reclamation Service.  
 WILL R. KING, Chief Counsel of the Reclamation Service.  
 H. T. CORY, in charge of drainage and cut-over land investigation, Southern States, for the Reclamation Service.  
 F. W. HANNA, in charge of drainage and cut-over land investigation, Northern States, for the Reclamation Service.  
 ELWOOD MEAD, in charge of settlement problems, Reclamation Service.  
 CLAY TALLMAN, Commissioner of the General Land Office.  
 CATO SELLS, Commissioner of Indian Affairs.  
 GAYLORD M. SALTZGABER, Commissioner of Pensions.  
 JAMES T. NEWTON, Commissioner of Patents.  
 PHILANDER P. CLAXTON, Commissioner of Education.  
 GEORGE OTIS SMITH, Director of the Geological Survey.  
 VAN H. MANNING, Director of the Bureau of Mines.  
 STEPHEN T. MATHER, Director of the National Park Service.  
 COL. F. MEARS, Chairman Alaskan Engineering Commission.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Office of the director and chief engineer: Morris Bien, assistant to the director; J. B. Beadle, secretary to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor Reclamation Record; E. C. Bebb and C. A. Bissell, engineers; J. H. Pellen, chief draftsman; F. L. Cavis, chief accountant; A. H. Gullickson, western district, Yakima, Wash.; C. E. Platt, southern district, Denver, Colo.; F. G. Hough, northern district, Helena, Mont., examiners of accounts; C. A. Lyman, chief of repayment accounts section; C. E. Harris, auditor of transportation accounts; Mrs. J. T. Davis, chief of auditing section; Miss H. A. Fellows, fiscal agent; C. H. Fitch, chief clerk; C. N. McCulloch, chief of mails and files section; Emmet Carr, purchasing agent; T. E. Brown, chief of stenographic section; G. W. Numbers, appointment clerk.

Office of the assistant to the director: D. H. Sibbett, J. E. Golladay, and A. G. Pollock, counsel; Mrs. G. B. Mathiot, and Alfred Dresser, assistant counsel; Mrs. E. W. Ballard, C. E. Womersley, and D. S. Koontz, clerks.

Office of the chief counsel: Ottamar Hamele, assistant to the chief counsel; Geo. A. Ward and E. W. R. Ewing, counsel.

## DENVER OFFICE.

F. E. Weymouth, chief of construction, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chiefs of construction; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munna, consulting engineer; E. A. Moritz, office engineer; J. L. Burkholder, drainage engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; S. E. Hedden, disbursing officer.

## FIELD OFFICES OF CHIEF COUNSEL.

**Denver, Colo.**—Law section office of chief of construction: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel. Office of irrigation district organization: E. W. Burr, district counsel; also in charge North Platte and Belle Fourche Project. Office of land titles: E. H. Peery, district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel; T. F. Fly, assistant district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**San Francisco, Calif.**—O. P. Morton and R. J. Coffey, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Truckee-Carson.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Helena, Mont.**—W. J. Egleston, district counsel. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel, Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

## PROJECT ORGANIZATION.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association: W. R. Elliott, project manager, Phoenix, Ariz.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppelmann, chief clerk; E. M. Phillebaum, fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Uncompahgre Project.**—F. D. Pyle, project manager, Montrose, Colo.; A. H. Peach, chief clerk; C. B. Funk, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise Idaho; C. C. Fisher, engineer; E. R. Mills, chief clerk; C. F. Weinkauff, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Huntley Project.**—R. H. Fifield, project manager, Ballantine, Mont.; G. H. Bolt, chief clerk and fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. T. M. Culbertson, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent, Browning, Mont.

**Sun River Project.**—G. O. Sanford, project manager, Fort Shaw, Mont.; H. W. Johnson, chief clerk; L. H. Kline, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Rothl, irrigation manager; J. R. Ummel, chief clerk; O. K. Barnes, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk; M. T. Murray, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melas, fiscal agent.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; C. C. Hogue, chief clerk; E. V. Hillius, fiscal agent.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Strawberry Valley Project.**—J. L. Lytel, project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Yakima Project.**—R. K. Tiffany, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Shoshone Project.**—A. H. Ayers, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; C. E. Brodie, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

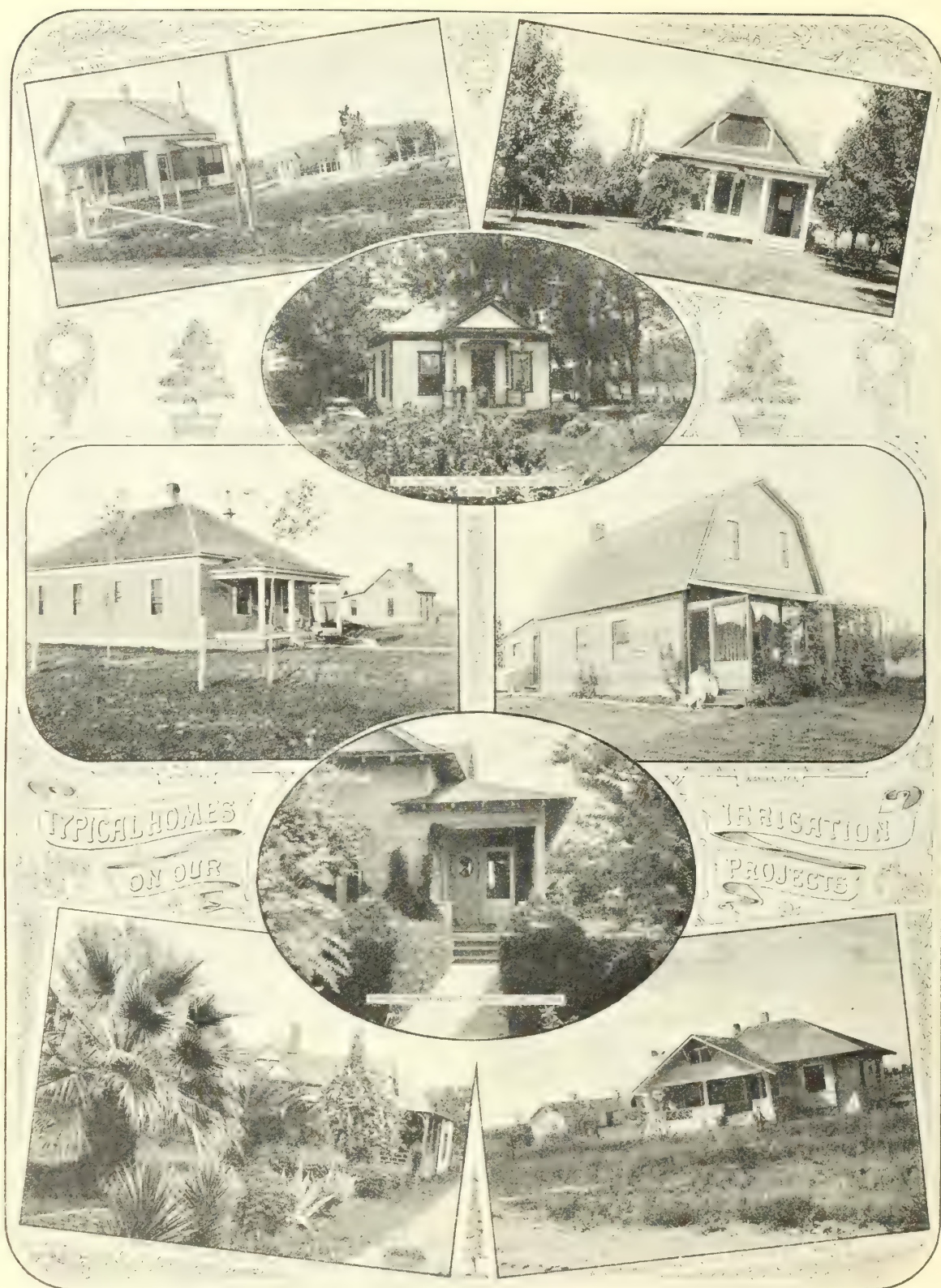
**Flathead Project.**—F. T. Crowe, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; R. V. Sass, superintendent of construction; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk and fiscal agent.

THRIFT IS POWER. SAVE AND SUCCEED. BUY W. S S





# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO Surer INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

VOLUME 11, No. 2

PRICE {NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

FEBRUARY, 1920



INTERIOR DEPARTMENT BUILDING FROM THE SOUTHEAST. CAPRONI BIPLANE ABOVE.



### IRRIGATION AND CITIZENSHIP.

By Arthur P. Davis, Director and Chief Engineer, U. S. R. S.

The advantages of irrigation are illustrated by the statistical fact that the annual farm census of the Reclamation Service shows the value of products on reclamation projects to be just about twice as large per acre as the average yield of unirrigated land in the humid region. Of course as the arid region is approached this discrepancy becomes much greater, and it is common to find land which is irrigated bearing a value fully ten times as great as adjacent lands without irrigation which are nevertheless farmed on a dry-farming basis. This shows the value of a complete and reliable water supply.

The main reason for the productivity of irrigated lands is the ability to apply water in just the quantity needed and to withhold it at will. But lands in the arid region have more mineral plant food in the soil as a rule and receive a larger amount of sunshine than those in similar latitudes in the humid region. These factors assist in producing the higher results obtainable, and in addition this and other surrounding circumstances tend to greater care in planting and cultivating the crops that are irrigated, where such attention is sure to bring large results. As a consequence of these causes we have closer settlement, more intensive cultivation, and much higher product under irrigation, which tends to encourage rural cooperation in other respects, and such cooperation is in fact enforced by the necessity of community use of the irrigation system which is generally not adapted to individual construction or operation. Such cooperation of course tends strongly to develop the community conscience and public spirit, which is one of the important distinctions between civilized and barbarous communities. The character of civilization produced by irrigated agriculture therefore has a tendency to create a higher order of citizenship than is the result without it.

## DIRECTOR DAVIS RECEIVES HIGHEST ENGINEERING HONOR.

On January 21, 1920, Arthur Powell Davis, director and chief engineer of the Reclamation Service, was elected president of the American Society of Civil Engineers—the highest honor in the engineering field.

We feel sure that our employees and our water users will be interested in the following brief sketch of the career of the man who stands at the head not only of the greatest home-making Service but of the most distinguished engineering organization in the world.

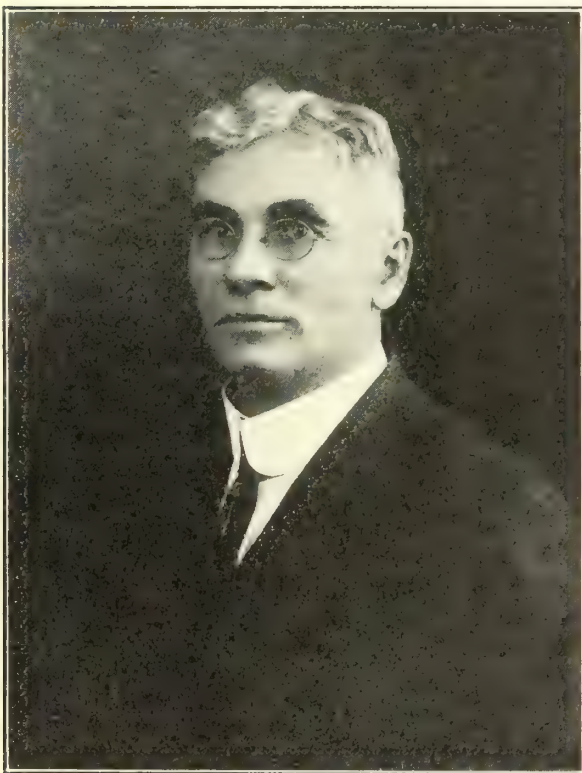
Director Davis was born in Decatur, Ill., February 9, 1861. He graduated from the State Normal School,

ment stream measurements; from 1898 to 1901 he was in charge of the hydrographic examination of the Nicaragua and Panama Canal routes; in 1907, when the Reclamation Service was made a separate bureau of the Department of the Interior, he was appointed chief engineer, and in 1914 director and chief engineer, the position which he holds at the present time.

The engineering work of Mr. Davis has been active and varied. He has had direct supervision of the investigation of proposed Government irrigation projects, the construction of scores of world-famous dams and other irrigation structures, and the operation and maintenance of the completed projects, and was recently in charge of an investigation to determine feasible reclamation projects throughout the United States as a whole, with a view to their development into cooperative community soldier settlements. His services have been called for on numerous occasions in a consulting capacity, one of his more recent noteworthy engagements being as a member of an engineering commission selected in 1914 to study the problem of reclaiming large tracts of agricultural land in China which have been inundated periodically for thousands of years, causing destruction of crops and resulting in famines and great loss of life. He was a member of the consulting board of engineers sent to Panama by President Roosevelt to report on the safety of Gatun Dam, and other canal problems; and again, in 1915, was a member of a committee appointed by the National Academy of Sciences to examine and report on the problems of the slides. At the instance of the Russian Government he examined large irrigation projects in Turkestan in 1911.

Mr. Davis has been a member of the American Society of Civil Engineers for many years and was elected a director of the society in 1917. He is a member of the Washington Academy of Sciences, of which he was vice president in 1908; the Washington Society of Engineers, of which he was president in 1907; the Cosmos Club, of which he was president in 1918; and is a charter member of the National Geographic Society.

He is the author of several books on engineering subjects, including *Progress of Stream Measurements*, 1897; *Irrigation near Phoenix, Ariz.*, 1897; *Irrigation Investigations in Arizona*, 1898; *Hydrography of Nicaragua*, 1899; *Hydrography of the American Isthmus*, 1902; *Water Storage on Salt River, Arizona*, 1903; *Irrigation Works Constructed by the United States Government*, 1917; and *Irrigation Engineering* (in collaboration with Herbert M. Wilson), 1918. He has also been a frequent contributor to various periodicals on the subjects of irrigation, the isthmian canals, and other hydrographic data.



ARTHUR POWELL DAVIS.

Emporia, Kans., and from the Columbian (now George Washington) University, Washington, D. C., with the degree of bachelor of science in civil engineering. He received the honorary degree of doctor of science from the same university in 1917.

From 1884 to 1894 Mr. Davis was a topographer with the United States Geological Survey, conducting surveys and explorations in Arizona, New Mexico, and California; from 1895 to 1897 he was a hydrographer in the same bureau, in charge of all Govern-



### EXPANSION OF RECLAMATION WORK FAVORED.

On December 16, 1919, United States Senator Charles L. McNary, of Oregon, submitted a favorable report from the Committee on Irrigation and Reclamation of Arid Lands on the bill (S. 2822) making available additional moneys for the reclamation fund.

The following statements regarding the Reclamation Service, its vast accomplishments in adding to the wealth and strength of the Nation, and the vital need for additional funds to continue this great constructive home-building work, are taken from this illuminating report:

The reclamation act was passed in 1902. Under it the Government has expended in construction work a little over \$123,000,000. Water for irrigation purposes has been made available for over 1,780,000 acres of land. This land before reclamation was largely barren, desert, waste, and unproductive. It is now estimated to be worth from \$100 to \$750 an acre. During the calendar year 1918, 1,051,193 acres were cropped, and the value of the product was \$66,821,396, or an average crop value per acre of \$63.60. The actual accomplishments have been little short of marvelous.

The money used has been wholly inadequate for the needs. This has rendered its expenditure more uneconomical than it otherwise would be. With funds sufficient to carry out rapidly well-developed plans, a far greater proportionate area could have been reclaimed.

In view of the results obtained, surely no one needs any argument to be convinced of the wisdom of the reclamation policy. Waste lands have been made productive. Great reservoirs of local, State, and national taxation and revenue have been created. Agricultural production has been greatly increased without injury to any section of the country. Prosperous homes have been built, towns and cities have grown up, and a great market for all kinds of manufactured products has been created, aside from the great addition made to the supply of food products. No similar expenditure of money by the Government has added such wealth and strength to the Nation as this.

It must not be forgotten, however, that the money expended is only a loan, and the fear that it would not be paid back must now be fully dispelled. The facts show that the money is being returned to the Government and that it will all be repaid in the end. Up to June 30, 1919, the accrued construction charges amounted to \$8,052,372, of which \$7,530,870 had been paid, leaving only \$521,000 due and unpaid, and that is very likely largely collected by this time. The aggregate of operation and maintenance charges June 30, 1919, was \$5,460,045.29, of which only \$560,607.77 was unpaid. Water rental charges aggregated \$5,627,694.29, of which only \$107,960.07 was unpaid. But very few, if any, private enterprises of this magnitude can make such a wonderful showing.

#### Repayments to reclamation fund to June 30, 1919.

Project.	Construction charges.		Operation and maintenance charges.		Water rental charges.		Power earnings.	
	Accrued.	Collected. <sup>1</sup>	Accrued.	Collected. <sup>1</sup>	Accrued.	Collected. <sup>1</sup>	Accrued.	Collected. <sup>1</sup>
Salt River.....	\$406,640.88	\$406,640.88			\$2,246,726.01	\$2,246,726.01	\$998,411.03	\$998,411.03
Yuma.....	453,338.87	322,681.62	\$177,348.37	\$154,157.64	455,426.03	454,905.75		
Orland.....	59,437.57	59,437.57	56,728.36	56,728.36	119,870.22	118,600.22		
Grand Valley.....					43,495.95	39,753.13		
Uncompahgre.....					741,376.38	741,166.38		
Boise.....	502,848.63	455,730.51	208,827.54	171,669.28	677,654.83	671,427.10	82,794.56	82,794.56
Minidoka.....	1,036,364.79	1,012,874.58	766,630.11	671,362.44	234,132.52	234,132.52	253,890.26	235,072.48
Huntley.....	300,948.84	296,031.39	205,205.54	190,260.95	2,631.95	2,404.11		
Milk River.....					46,157.71	46,576.76		
Sun River.....	115,328.60	111,951.14	81,391.94	75,509.14	1,478.50	1,223.50		
Lower Yellowstone.....	74,146.84	10,044.75	138,467.80	35,835.83	87,205.19	83,896.01		
North Platte.....	950,327.56	832,916.11	816,047.84	748,742.33	36,652.37	35,570.62		
Newlands.....	378,501.95	374,848.06	372,697.60	355,651.62	9,053.40	8,989.90	76,617.48	74,465.91
Carlsbad.....	221,963.30	207,956.79	240,308.89	227,609.98	14,483.23	14,424.28		
Hondo.....					9,192.09	9,037.50		
Rio Grande.....					644,016.27	559,285.30		
North Dakota Pumping.....	8,863.18	8,863.18	24,278.91	12,964.28	2,948.58	2,149.03	173,931.51	170,958.46
Umatilla.....	332,826.11	318,492.33	153,056.97	131,742.74	21,836.59	21,328.06		
Klamath.....	395,059.89	373,610.07	267,069.60	246,666.72	38,372.75	38,372.75	3,020.00	3,020.00
Belle Fourche.....	331,076.91	313,257.38	374,855.24	325,842.90	3,088.44	2,938.44		
Strawberry Valley.....	127,249.66	120,665.90	64,392.43	62,347.98	5,213.89	5,213.89	40,231.79	38,277.75
Okanogan.....	84,130.06	31,569.75	70,711.26	47,960.98	106,199.82	102,178.00	1,754.71	1,754.71
Yakima Storage.....	515,504.40	514,804.40	31,930.13	31,904.08	21,792.50	21,194.50	1,766.13	1,766.13
Yakima Sunnyside.....	914,307.76	893,118.15	855,933.34	834,489.43	46,441.05	46,279.73	1,869.20	1,869.20
Yakima Tieton.....	483,490.31	461,074.72	310,229.41	290,266.49	6,216.50	6,216.50		
Shoshone.....	410,015.63	404,308.91	243,934.01	227,724.34	6,011.52	5,743.63		
Total.....	8,052,371.74	7,530,878.19	5,460,045.29	4,899,437.52	5,627,694.29	5,519,734.22	1,634,286.67	1,608,390.23

<sup>1</sup> Includes credits on account of contributed work and discounts allowed. Does not include advances, penalties, forfeitures, and refunds.

NOTE.—In addition to the above, miscellaneous collections, comprising sales at stores, miscellaneous service, refunds, overdisbursements, advances for the construction of Jackson Lake reservoir, reimbursement for the construction of Indian projects, etc., amounted to \$8,954,944.09.

The reclamation act of 1902 provided that the proceeds from the sale of public lands should go into the reclamation fund and be used for irrigation purposes. That is the source from which the money to do this great work has largely come. In 1908 the proceeds from the sales of public lands was over \$10,000,000, but this has been diminishing every year until for the fiscal year 1919 it was only \$1,959,497. From this it will be seen that unless something is done promptly this great work will come to a standstill. In fact, it has done so already. No new projects have been undertaken for many years, and the projects undertaken are far from completion, and can not, under the present conditions, be carried to completion.

The cost to complete the projects now under way is estimated at \$112,134,000. This expenditure would add over 2,000,000 acres more of irrigable lands. New projects have been examined and are now in shape for approval that would cost about \$160,000,000, and would add something more than 2,250,000 acres to the irrigable area. This development can not take place under present conditions. Private capital will not do this work. All the smaller quickly remunerative projects have been worked out. Those remaining are the larger projects where, from the very nature of things, a large investment is required, and no substantial return can be had for several years until the lands can be made productive and those working them get on a substantial living basis, which must be worked out of the land itself.

What more constructive work can we do than to provide for this great thing? The time is opportune. Our great need is increased agricultural production. This must come largely through increased cultivated acreage. Suitable unirrigated public land is not available. This is all gone. Any increase must come through reclamation or not at all. Thousands of men who served in the armies abroad are seeking homes and an outdoor life. Thousands more should leave our overcrowded cities and go into agricultural pursuits. This enterprise will, to a degree, meet all these conditions. The wise and economical thing to do is to make provision so that a broad and comprehensive plan can be carried on over a period of several years as rapidly as the needs require and the conditions will permit. In this way the ultimate cost will be much less proportionately than heretofore.

This is the purpose of this legislation. It authorizes an ultimate expenditure of \$250,000,000 for reclamation purposes. This amount will not be actually appropriated, however, except upon annual estimates duly submitted to Congress and acted upon. But little, if any, additions will need to be made to the permanent or overhead Reclamation Service organization. The entire amount of the authorization will probably not be appropriated for 8 or 10 years, and it will begin to return to the fund in repayments

## SECRETARY LANE REPLIES TO NEW YEAR'S GREETINGS OF RECLAMATION SERVICE EMPLOYEES.

WASHINGTON, January 3, 1920.

HON. A. P. DAVIS,

*Director and Chief Engineer,*

*U. S. Reclamation Service.*

MY DEAR MR. DAVIS: Will you please convey to the employees of the Reclamation Service my very warm appreciation of their greetings, and express to them, without stint, the satisfaction that has been mine in working with them during the past seven years. As the time approaches when I must leave, it grows even harder than I had anticipated to say good-by. Never has a man been better supported by those with whom he worked than have I by the many people in this department, and never have I known so large a group of competent and zealous workers. No matter what my fortune in the future, I shall always regard myself as extremely fortunate to have been in this department for so long a time and to have come to know its people and their spirit so well.

Cordially, yours,

FRANKLIN K. LANE.

## BROAD RECLAMATION POLICY ADVOCATED.

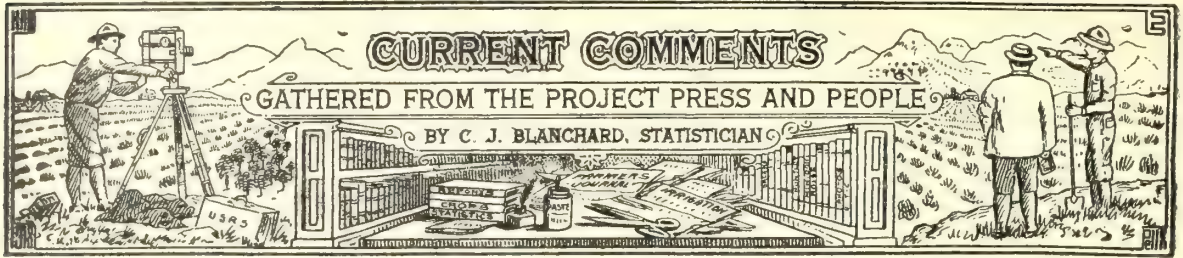
As a result of the organization of the Western States Reclamation Association at the irrigation congress in Salt Lake City, Utah, November 21-22, the executive committee of the association, together with the governors and lieutenant governors of a number of the States and several other State representatives, arrived in Washington, D. C., on January 14 with a view to urging Congress to adopt a broad policy of irrigation development.

The delegation included Governors Simon Bamberger, Utah; Thomas E. Campbell, Arizona; O. A. Larrazolo, New Mexico; D. W. Davis, Idaho; Robert D. Carey, Wyoming; Louis F. Hart, Washington; Lieutenant Governors George Stephan, Colorado; William McDowell, Montana; and Frank W. Brown, secretary to Governor Davis.

The members of the executive committee comprised the following: E. F. Blaine, Seattle, Wash.; J. E. Edwards, Forsythe, Mont.; R. E. Shepherd, Jerome, Idaho; Fred E. Lucas, Denver, Colo.; Percy Cupper, Salem, Oreg.; Frank C. Emerson, Cheyenne, Wyo.; R. F. Burges, El Paso, Tex.; Sims Ely, Phoenix, Ariz.; Francis G. Tracy, Carlsbad, N. Mex.; W. R. Wallace, Salt Lake City, Utah; W. E. Beard, Sacramento, Calif.; J. T. Whitehead, Mitchell, Nebr.; and Mr. Rogers, Fallon, Nev.

before this, and the amount that will accrue in local, State, and Federal revenues will exceed this amount before it is all expended.





*Arizona—Salt River project.*—J. W. Lesueur and John Cumnard have closed a deal with Harry L. Chandler, manager of the Southside Gas & Electric Co., whereby they have taken over 480 acres of the richest land in this section of the county, at a consideration that runs close to \$250,000.

The ranch is situated 3 miles north of Chandler and that portion of it that has been bought by Mr. Lesueur and Mr. Cumnard will be planted in cotton next season. Mr. Chandler retains a quarter section of the land, as well as his herd of Holstein dairy cattle. Included in the purchase is a large amount of farm machinery and stock, estimated at close to \$30,000 in value.

According to a report issued by the Phoenix Chamber of Commerce, there are now 188,232 acres embraced under the Salt River project, and this acreage produces a revenue of \$22,114,982, an average of more than \$110 an acre.

The chamber of commerce states:

There are 295,000 acres in all under irrigation and cultivation in Maricopa County, and using the same revenue per acre, we get a total revenue for farm lands in Maricopa County of over \$33,000,000. Adding another \$5,000,000 for revenue from live stock, poultry, etc., we approach nearly the \$40,000,000 mark for the year 1919. The added value of by-products from agricultural crops will easily give us the \$2,000,000 to make the total of \$40,000,000.

The assessed valuation has grown from \$9,000,000 in 1910 to \$31,500,000 in 1918–19 in the city of Phoenix, and Maricopa County has increased from \$17,000,000 in 1910 to \$98,000,000 in 1919.

Bank deposits have grown in Arizona from \$19,000,000 in 1910 to \$67,000,000 in 1919. In Maricopa County the deposits have grown from \$5,000,000 in 1910 to \$19,000,000 in 1919; the city of Phoenix from \$4,500,000 to \$15,000,000.

Postal business has grown from \$80,000 in 1911 to \$227,000 in 1918.

The school census in Maricopa County in 1917 was 14,770; in 1919, 20,869. The 1910 census gives the city of Phoenix a population of 11,134. The chamber of commerce estimates that the present population is 40,000.

Using this figure as a basis, Harry Welch, secretary of the chamber of commerce, has estimated that if there is an annual increase of 20 per cent in the population, Phoenix will be a city of 100,000 in 1925.

Arizona had 92,000 acres planted to cotton this year, according to a folder on long-staple cotton issued by the commissioner of immigration of Maricopa County and placed in the hands of the chamber of commerce for distribution.

One of the interesting facts brought out in the leaflet is that cotton has been grown in Arizona for unnumbered centuries. There are said to be evidences that cotton was raised here by prehistoric people who inhabited the various cliff dwellings and desert cities. But this cotton was of an inferior quality. The long-staple cotton was introduced from Egypt about the year 1900. But the cotton-raising industry here did not come into its own until 1911, when Herbert Atha, a Salt River Valley farmer, obtained seed from the Sacaton Indian Reservation to plant about 5 acres of the Yuma variety. His success with this led him to plant 400 acres of the long staple the following year.

*Arizona-California—Yuma project.*—The public sale of nearly 5,000 acres of choice mesa lands which occurred December 10-13 was a success. Competition was keen. The average for all the units was \$230 per acre.

Under subsequent arrangements the remaining units, embracing about 1,400 acres, will be sold to the highest bidders on Tuesday of each week until June 10, 1920, unless disposed of sooner.

Yuma citizens not only cooperated heartily with us in promoting publicity for this sale, but they showed their faith in the land and in the project by purchasing more than a half million dollars worth of it. The statistician acknowledges with gratitude the splendid assistance given by the Commercial Club, the Yuma press, and her live-wire citizens. Generous space was given the sale by the newspapers throughout the county, and the inquiries numbered thousands. Washington, D. C., was represented to the extent of a purchase amounting to \$13,500.

Owing to the rules governing the railroads we received little assistance from this source, nothing in the way of special rates, literature, or press notices being provided. Yuma folks contributed the wherewithal to pay for half-page advertisements in a number of California and Arizona papers, and the Commercial Club sent out a large number of attractive booklets. The Washington and Yuma offices distributed an edition of 5,000 booklets to homeseekers.

Commenting on the sale, a very prominent railway official writes us as follows:

I have received a report to the effect that practically all of the farm units were disposed of during the first two days of the sale, and I want to congratulate you on the success of your advertising campaign and other efforts in connection with this auction. The result of this sale certainly presages the successful opening of the entire irrigable area on the mesa.

The results of the sale are exceedingly gratifying to us. For more than seven years we have kept interest alive in the mesa by corresponding regularly with several hundred interested people from all parts of the country. With numerous good friends in the valley we have never faltered in our belief that this area would some day become the show place of the Southwest. Realization of our dream apparently is not so far off.

Yuma has again busted a record, and this time everybody is disappointed. Late in December there occurred a day, the first one in 45 years, when the sun for a whole day was not visible to the people who dwell in this land of almost perpetual sunshine. Ye genial host of the leading hostelry who has decorated the front of his building with the striking sign "Free board every day the sun doesn't shine" at last was called upon to pay.

*California—Orland project.*—A check for \$22,183.97 was forwarded on December 3 by the Orland Water Users' Association to the United States Reclamation Service as payment in full for the construction and building charge due from the Orland project, "The Project of No Regrets." In keeping with the enviable reputation of payment to the penny on the dot, the money was forwarded as soon as the books covering the assessment could be closed. This payment represents the payment of the fourth building charge and the second ditch lining charge, totaling \$1.10 per acre. Orland's reputation for prompt payment is still unblemished.

The allurements of Orland and her people apparently have reached to the Minidoka project for the recent real estate transfers show a surprisingly large number of Idaho project people among the new purchasers of Orland property. Among these are many old acquaintances, F. N. Victor, W. C. Blummer, Amos H. Gill, and Forest Markland, all from Rupert, Idaho, are now ranch owners on the Orland project. If this movement keeps up much longer, an Idaho reunion at Orland will greatly resemble an Iowa picnic at Los Angeles.

This from Orland supplies an answer to the question in a childish ditty, "How doth the busy little bee, etc.":

W. E. Spence has finished gathering his year's crop of honey. Mr. Spence has not gone into the bee business, only been cleaning a chimney. There has been

no fire built in the house in Bungalow Row for over a year, but recently Mr. Spence decided to look over things and see that the place was in good shape. A fire lighted in the front room stove absolutely failed to draw. Investigation showed that the chimney was filled with honey to within 2 feet of the top. A force of men was secured to extract it, and 12 feet of solid sweet was taken out before the bottom was found and a draft got through. Most of the honey was of good quality.

Seven years ago in January, a retired newspaper man from North Dakota turned the first shovel of earth on an unbroken 40 acre tract east of Orland. This ex-newspaper man hardly knew one fruit tree from another at that time, and unlike most newspaper men, made no bones about it. He sought advice and watched neighbors. Only the finest nursery stock obtainable was allowed on that 40 acre tract.

The first 20 acres were planted to almonds. A year later 10 acres were planted to the finest orange trees available. Three years ago the same high-class stock of lemon trees was planted on 3 acres. Two years ago, the remaining 7 acres were planted to olives. Recently that ex-newspaper man, A. E. Lindstrom, sold the 40 acres which were nothing but untouched land seven years ago, for \$1,000 dollars an acre, a total of \$40,000. Frank E. Rosenberger, of Rupert, Idaho, was the purchaser, and experts who know the property believe that Rosenberger got a bargain in the forty.

*Colorado—Grand Valley project.*—The Holly Sugar Co., at Grand Junction paid approximately \$1,000,000 to beet growers in Grand Valley and vicinity in 1919, a sum which has much to do with the present prosperous condition of the farmers. A. E. Carlton, president of the company, announces that \$100,000 will be spent this year in improvements to make the plant modern. Betterments to cost \$30,000 will be made also on the property of the Grand Junction Electric & Gas Co.

*Colorado—Uncompahgre project.*—Deserved honors were accorded John Howell, Uncompahgre Valley's best farmer booster, recently by the Montrose Chamber of Commerce, which, in addition to an elaborate banquet, presented him with a handsome gold watch and chain. The toastmaster, C. E. Earnest, paid fitting tribute to the splendid service rendered by Farmer Howell, whose prize-winning exhibits of crops for many years have carried the fame of his home valley to all parts of the land. One of the newspapers of the valley salutes our friend John thusly:

John Howell, The Press salutes you. What you have done and what you are now doing for the Uncompahgre Valley can not be measured in dollars and cents—can not be estimated. Your work and your exhibits will bring many new farmers into this locality. The advertising Montrose County will receive will be worth an untold sum.



We ought to be proud of you; we are proud of you. We all may not appreciate what you are doing, the time you are giving up for the benefit of the country of your choice, but the most of us do appreciate you and the splendid success of your expert farming.

The 160-acre farm near Flat Top, owned by Mr. Okey, who lives in California, and which has been occupied for many years by a brother of the owner, was sold recently to Messrs. Jesse and James O'Neill, the consideration being \$10,000.

This is a fine piece of land, lying near town. Messrs. O'Neill bought it as an investment.

On display in a show window in Montrose is some of the fine corn that took the blue and other ribbons at the recent Olathe Corn Show. It is a wonderful display of both yellow and white corn, and the best of all is it was all grown in the Uncompahgre Valley.

The corn is so fine it would make the corn growers of Iowa and Kansas sit up and take nourishment, for we doubt very much if any could be found that would excel this.

The development of corn growing in the Uncompahgre Valley is but a sample of that in all other lines. Just a few years ago it was not thought possible corn could be made to mature here with any success, but now it is surprising the amount of acreage sown every year and the yield per acre.

*Idaho—Boise project.*—In a memorial which will be presented by the Idaho woolgrowers to Congress it is urged that the strongest support be given the program of the Western States Reclamation Association. The memorial, which was passed unanimously at the recent annual convention at Boise, is as follows:

Whereas we have viewed with pleasure the active interest taken by the Western States in reclamation through the initiative of Gov. Davis of our own State; and

Whereas the development of the West will greatly increase the wealth of the United States at an initial cost which is approximately low; and

Whereas the West was such a huge factor in production of necessities through the trying period of the war: Therefore be it

*Resolved*, That we memorialize the Senators and Representatives in Congress of the Western States to give their strongest support to the suggested program of the Western States Reclamation Association so that its comprehensive policy of building and provision for increased production may receive the unanimous support it deserves from the Representatives of the Western States.

If the present negotiations between the Federal and State Governments go through Idaho is likely to have one of the biggest and finest game preserves in the United States, if not the world. It will be fenced to keep off prowling wolves and coyotes and stocked with the big game of the continent—antelope, caribou, buffalo, elk, deer, moose, and other animals, and become the breeding grounds for them. Upon it may be located a lodge for the Elks order of this State and that lodge may become the central distributing point for elks for lodges in other States. This is part of

the plan of the Idaho Game Breeders' Association, recently organized. The association expects to have a large farm located at Thousand Springs as a general headquarters and the source of food supply for the game animals.

Idaho has sold 646,108.65 acres of land since statehood, has piled up endowment funds aggregating about \$12,000,000, and has still in her possession unsold land sufficient to bring her endowments to more than \$60,000,000. This amount, at 5 per cent interest, will insure to the State for all time to come an annual income of \$3,000,000, reducing State taxes accordingly.

*Idaho—Minidoka project.*—During the past year breeders of Cassia and Minidoka Counties have attended sales and meetings of the various shorthorn associations of the State and are bringing to the Minidoka project and surrounding country excellent individuals of that breed. Several very successful sales have been held both at Burley and Rupert. Cooperation, both in breeding efforts and in advertising the breed, is one of the main reasons for the popularity of the shorthorn cattle.

The live-wire breeders of these two counties gathered together at the office of the county agent, E. E. Chester, recently, and organized what is known as the Minidoka-Cassia Shorthorn Breeders' Association. They plan to affiliate with the State and branch organizations of shorthorn breeders.

These are happy days for the farmers of this project. The rain and snow which have fallen recently give us the best prospects for an abundance of water for irrigation that we have had for two years. Conditions on the Minidoka National Forest Reserve, the watershed for the local streams of Cassia County, are better at this time than they were on March 1 last year. Early rains filled the ground with moisture, and the late snows are piled in deep drifts.

The year 1919 has been one of the busiest in the history of Rupert in the way of buildings, there having been 62 new buildings this year against 21 for 1918. Among these are the fine new building of Fred Reiman's on the south side of the public square, which is being used for commercial purposes; the brick building of the Rupert Sheet Metal Works on the south side of Fremont Avenue; the building of Overlie & Gregory, and also the Burke building near the post office, the producers having purchased the building of Overlie & Gregory; the Idaho Creamery, the Catholic rectory, and many other fine residences too numerous to mention.

The cheese factory recently built in Rupert is in full operation now and is one of the greatest assets to the city. Swift & Co. want to enter into a contract with the company for the whole output of the factory.

The Idaho Creamery is making some of the best butter in the State.

The city of Rupert is not stopping its activity in the way of buildings, having let a contract for the construction of pavements for 13 blocks around and adjacent to the public square, which cost in the neighborhood of \$113,000. The city has also let a contract for the construction of sidewalks all over town, which will give to the residents free mail delivery when they are completed, this contract amounting to \$99,000. The city is growing so rapidly that the sewer system must be enlarged, costing in the neighborhood of \$40,000 more, and there is considerable talk in building a nice large city hall. The city will soon own the electric plant, having entered into a contract with the Government for the distribution of electricity in the city of Rupert for a period of 10 years.

*Montana—Huntley project.*—In the spring of 1910 the statistician and a reformed locomotive engineer were engaged in earnest converse on the corner of a 40-acre ranch nearest the town site of Ballentine. The ranch and the engineer belonged to each other, and the latter was telling about his experience his first year on the land. It was nothing to crow about. He had planted the generous assortment of seeds former Senator Joe Dixon had sent him, and while everything grew, there was not enough of anything harvested to market. But he wasn't a mite discouraged. He was planning big things in 1910, and the little ranch was in good shape for planting. Well, we got the habit of running out to this fellow's ranch, and our interest was really and truly in seeing what he could grow, and not wholly in the good things his wife put on the table for us.

One day there came a letter which said, "Come out here and see the best corn ever grown in Montana." Do you get this? Corn in Montana! October found us on the ranch, and we found the locomotive engineer driving a corn binder and putting up as fine a lot of matured white dent as a Minnesota corn farmer ever raised. That fall this corn sharp swept the State and county fairs with his exhibit and incidentally marketed at big prices the bulk of his crop for seed. Ever since that time Elmer Eiker, boss Montana corn grower, has been showing 'em how to do the trick of maturing corn in the short season of this northern altitude. And now what do you think he has done? At the great International Hay and Grain Show in Chicago in December Elker won the famous prize for the best single ear of corn. Montana is mighty proud of you, Elmer, and so are we.

*Montana—Lower Yellowstone project.*—Let us see says the News man. How many years ago was the time when the cattle in this valley were not respectable scrubs? When the milch cow was a rarity? When steers had no more value than their hide,

which sold, green salted, for 5 cents per pound, and the butchers were making their customers a present of liver and heart and, if the customer was not satisfied, in went a hunk of bologna for good measure? When our merchants sold canned milk by the case and no one was mean enough to rob any poor old cow of her calf's feed?

Since that time the herds of pure-bred shorthorn, Angus, and Hereford have almost driven the grade from the plains of the lower Yellowstone. The farmer who does not boast of from 1 to 50 pure-bred cattle is now the exception. Such farmers as R. C. Flynn, Sam Hardy, John Helm, and others near Fairview lead the valley in shorthorns, while C. E. Varco with his polled Angus and W. D. Kemmis with his shorthorn herd at Sidney can be pointed out as the leading breeders and are the equal of thoroughbred breeders in any other part of Montana.

This great change has been made in such few years that the echo has not died away from the croaker's yell "shotgun farmer." Shotgun? The dickens! That term was applied by office farmers who farmed with their feet 6 inches higher than their heads and too lazy to take them down unless they were tickled with a two-bit piece of money. It requires capital, muscle, and brains to farm these days and lower Yellowstone farmers know it.

*Montana—Milk River project.*—A farmer on the Milk River project realized the remarkable return of \$106 per acre from his alfalfa crop the past season. He thrashed the alfalfa for seed and thereafter sold the alfalfa straw as well, getting \$15 per ton for it. Figuring a return of 10 per cent on the investment, it is figured that irrigated land in that project is worth \$1,000 per acre.

*Nevada—Newlands project.*—George Wingfield, owner of the fine Calvada ranch, comprising 640 acres of the most fertile land in the project, has decided to complete the placing of the entire tract in cultivation and within a short time will set surveyors at work subdividing the full section into eight units of 80 acres each. These will be improved by the erection of modern farm plants, including bungalows, barns, and other needed structures, and Mr. Wingfield will, during the coming year, offer these tracts for sale on easy terms to industrious heads of families, who will thus be given an opportunity to acquire a home through the expenditure of energy and small annual money outlays.

The land to be offered is ideal for alfalfa and general purpose farming, including fruit growing, and the announcement of Mr. Wingfield's intentions will undoubtedly be sufficient to encompass the immediate sale of every tract.

More Newlands project land is being taken under the homestead act and by purchase from the Central Pacific Railroad Co. during the present season than



at any previous period in the history of the valley with the possible exception of the first year following the completion of the Government irrigation works here. It is estimated by competent authorities that 50 new families are arriving in Fallon monthly from distant points, properly imbued with an appreciation of the opportunities existing within this Government irrigation enterprise. And it is not difficult to fix upon the reason for the present rapid rate of settlement, for here one finds virgin land and lots of it, entirely susceptible of profitable crop growing, that may be acquired for approximately one-tenth the figure demanded on the other side of the Sierras, or for those who prefer settling on public lands late Federal law enactment has made comparatively easy the acquisition of land title by actual settlers who by compliance with the land laws quickly find themselves possessed of land holdings equal to the best anywhere in crop growing and home building possibilities.

C. P. Whitney has sold his 150-acre ranch 6 miles southeast of Fallon to Mr. Short, who comes from the northern part of Elko County. This land was first located by a man named Reinhart in 1876. He sold it to Mr. Sanford, who in turn disposed of it to Thomas Dolf for \$500. Twelve years ago Mr. Dolf sold the land to C. P. Whitney for \$3,200. The latter improved the land and sold it this week, with 65 head of horses and cattle and all implements and equipment, to Mr. Short for \$30,000. This shows what improving and developing land will do, in connection with the natural enhanced value through the growth of the country.

*New Mexico—Carlsbad project.*—All the shareholders under the Carlsbad irrigation project are desirous of extending the project to its full capacity of 50,000 acres of irrigable land and the directors of the association held a meeting recently for the purpose of taking the first steps in that direction. There are two large bodies of land which can be irrigated, one lying under a high line canal west and south of Carlsbad, or which can also be reached by a pumping station at the siphon, and a large body south of Black River. Both bodies of land contain much State land, and the State engineer and the State land office have been asked to help in the work of bringing this additional land under water.

*New Mexico—Texas—Rio Grande project.*—Las Cruces High School claims the champion junior stock judge of the United States. This honor was won for the school by one of the agricultural students at the International Live Stock Show, held at Chicago, November 29, to December 7.

Harry Berrier, age 16; Oral Behymer, age 17; and Moody Kilgore, age 15, three of the agricultural boys of the Las Cruces High School, composed the judging team that represented the entire State of New Mexico

in the judging contests during the show. The boys have had considerable instruction and practice in judging live stock and went to the Windy City with a firm determination to bring home laurels.

The junior free-for-all judging contest was held on Saturday, November 29. All boys and young men under 19 years of age, from any country, were eligible. Nearly every State of the Union and several Provinces of Canada were represented. The 22 champion baby beef steers in the junior feeding contest were used as rings for judging, and the contestants were to place the first five best animals in the right order. After the grades of the judges were counted up, Harry Berrier stood highest of all the contestants with a grade of 96 per cent. The boy was awarded a prize by the International Live Stock Exposition and is also to receive a local prize from a prominent hog breeder, of a pure-bred gilt.

The farmers need connections with some one or several, as the case may be, national concerns that can handle their product to the best advantage and assure a reasonable profit for all the farmer can raise.

Some of these concerns already have created a big demand in the East for California spinach and asparagus. The Mesilla Valley is in the spinach and asparagus paradise. Spinach is an easy crop here and is planted just at the close of the cantaloupe season, and is finished off just before the beginning of the next cantaloupe season so that the two big crops can be rotated at a big profit. Asparagus grows prolifically in the valley, even growing wild along the ditch banks.

The Mesilla Valley farmer is coming into his own and with it the valley is facing a wonderful era of prosperity. Land is in great demand and many land buyers are constantly arriving in the upper and lower valleys. A piece of land within 4 miles of Las Cruces was bought recently and turned a few days later for a handsome profit.

A new industry in the valley is the raising of sheep. One farmer, who has done more than anyone else to awaken interest in this industry, purchased a year ago a flock of blooded sheep. To-day he has over \$2,000 worth of sheep on his ranch and has entered into the business of raising rams for his neighbors, who, seeing his success, have arranged to go and do likewise. Besides this valuable flock of sheep he has turned off, in wool and lambs (the latter bringing top prices), more than his original investment in sheep. He says it is destined to be one of the biggest money makers for the farmer that we have in the valley and he urges that every farmer have at least a few sheep on his ranch. They will grow fat where a cow or a hog will starve to death and will clean up weeds and other trash around the farm and along the ditch banks.

*North Dakota pumping project.*—Volume 1, No. 1, of the Williston Magazine has come to our table—the ably edited and artistically illustrated mouthpiece of the chamber of commerce. Its contents are varied and extremely interesting. The leading article is by Project Manager W. S. Arthur, the real optimist of the Muddy Valley. Arthur believes in Williston country, has always believed in it, even when most of the farmers there had no faith. It looks now as if his faith was about to be rewarded. A live commercial club is now in the harness, and with options on the lands of a lot of doubting Thomases a big drive is being made to get real and experienced irrigation farmers to come to Williston. Land prices as quoted look mighty good to us. Homeseekers better stop over en route West and investigate.

*Oregon—Umatilla project.*—The C. S. McNaught Co. has shipped in a car of machinery for the installation of a molasses alfalfa meal plant. For the past year and a half the company has been making dry alfalfa meal and shipping it principally to the molasses-mixing plants at Portland and Seattle. With this new equipment they will be able to make and sell to the trade in car lots molasses alfalfa meal, which is so highly prized by the dairymen of the Willamette Valley and Puget Sound country. It is the belief that the mixing of the molasses with the alfalfa meal in a plant situated in the heart of the best alfalfa-producing district in the Northwest will give greater confidence to the dairymen who are users of this product, and will assure them of getting nothing but No. 1 alfalfa hay in the mixed feed, with no adulterations.

The election held in December at the offices of the Reclamation Service in Hermiston for the purpose of determining whether the lands in certain territory in this part of the project should be embraced in an irrigation district carried away and beyond the expectation of the most ardent supporters of the irrigation district plan. There were 111 votes cast, and of this number 106 were for and 5 against.

We have read with much interest and profit an excellent description of Boardman, the thriving 3-year-old town on the West End extension unit of the Umatilla project. It is from the pen of A. W. Cobb, president of the Commercial Club of the new town. We regret that lack of space will not permit its publication in these columns. Mr. Cobb states that the West End extension is now an irrigation district, and as a result a Federal Farm Loan Association is organized and ready to operate.

*Washington—Okanogan project.*—Despite all drawbacks, apple production and shipments for this season from this community will go over the 600,000 box estimates.

The following figures, supplied by the two largest shipping plants, give an excellent idea of the size to which the apple business has grown in this vicinity:

During this season, the Omak Fruit Growers (Inc.), purchased for its members 400,000 boxes, of which 370,000 were actually used, at a cost of \$85,000; 30 tons of box nails, costing \$3,450; 85 tons of paper, costing \$21,000; 300,000 labels, costing \$1,500; other necessary material and merchandise amounted to \$43,050; while the labor and services, warehousing, and packing has amounted to \$50,000; or a grand total of \$204,000, that was needed to harvest and ship the crop grown by the members of this organization. In the item of \$50,000 is included the weekly payment of 15 cents per packed box disbursed to all orchardists who packed at home. This payment was made every Monday on the basis of the number of packed boxes delivered to the warehouse.

To date the fruit growers organization has shipped 200,000 boxes of apples, or practically two-thirds of the crop they will handle for the season. Actual returns to the orchardist amount to approximately 68 cents per box in cash and supplies on the basis of the entire crop, or about \$1 a box on the actual amount shipped.

The Omak Warehouse & Storage Co. handled a total tonnage of over 250,000 boxes, secured the necessary supplies for its members, built a new and modern storage plant, spur track, run a box factory on the side, and is now running a logging crew on its newly acquired timber reserves east of town. The above tonnage figures do not include culls or wind-falls handled.

Up to date this company has disbursed practically \$110,000 in cash to its members and is right now lining up another big dividend, to be paid in a few days, to amount to 50 cents a box on their total tonnage. This payment will be divided half cash and half to apply on supplies furnished.

*Washington—Yakima project.*—Over \$297,500 has been paid out to local growers during the last season by the Libby, McNeill & Libby cannery, according to figures given out by R. T. Turvin, general manager. The amount covers delivery by growers to the cannery of 470 tons of cherries, 500 tons of peaches, 1,700 tons of pears, 4,500 tons of apples, and 325 tons of vegetables. The company, says Turvin, is urging growers to raise more small fruits and increase the supply of vegetables, as the deliveries of the last season by no means taxed the capacity of the cannery.

From 150 to 500 employees are carried on the pay roll of the company during an operating season of nine months, and during the three months when operations are curtailed about 25 persons are employed.

The pay roll of the company up to the first of the year is \$170,733. Operating costs of the cannery were reduced this year by the increased tonnage that was handled due to the installation of new machinery.

Phillip Hitchcock, although only 11 years old, has demonstrated without a question of doubt that there



is money in pigs. Through the First National Bank of Sunnyside he borrowed \$35, bought a sow, and became a member of the Sunnyside Boys' Pig Club, a very active organization in this part of Yakima County. The first litter was not large, only four in number, but nothing daunted Phillip proceeded to take care of them and raise them under the methods taught him by his instructor. He sold two pigs at the Boys' Pig Club auction sale for \$40 and the other two, he says, are worth more. With his obligation met at the bank, Phillip has a sow and \$5 to boot, an excellent illustration of what can be done on the farm.

This from our good friend the editor of the Yakima Republic is appreciated:

A few weeks ago the Republic attempted to set the Kansas City Star right on the subject of Government reclamation by pointing out to it some of the remarkable fruits of the Federal irrigation policy in this valley. The Star had expressed the opinion that it is wrong to throw away the money of the people on these desert projects.

We now commend the attention of the Star to the annual report of Secretary Franklin K. Lane, of the Department of the Interior in which the whole subject is covered in detail. The facts set forth by Mr. Lane, showing what has been accomplished under the reclamation policy and on the various Government projects, are amazing.

It is but 17 years since the reclamation law was passed, and not more than a dozen years since land under the various projects began to be ready for settlement. In fact, the greater part of the construction work has been done within the last 10 years. Yet to-day the Reclamation Service is in a position to deliver water to 1,600,000 acres of farming land on its own projects, and actually did deliver during the past season the water needed for 1,120,000 acres. We do not know how much the Government has expended on these great improvements, but the total sum is much less than the crop returns have amounted to up to the present time. During the six years from 1913 to 1918, inclusive, the farmers on these Government projects produced over \$200,000,000 worth of stuff, not including live stock, and, though the returns are not in yet for 1919, it is safe to say that the production for this season alone was not worth less than \$100,000,000. Probably the total is even greater than that, for the products of the Yakima projects alone have amounted to one-fifth or one-sixth of that sum. In 1918 the crops of the Yakima projects, on which \$10,000,000 had been expended, were valued at \$9,700,000.

On these various projects there are now, as Mr. Lane says, more than 200,000 prosperous and contented farmers, and in the towns and cities that have grown up under the ditches are as many more people for whom Government reclamation has made homes and business.

As before said, we do not know how much the Government has expended on this great work, but the total amounts to but a fraction of the returns to the farmers alone in seven years, and in due time the Government will be reimbursed for all that it has expended.

The Federal reclamation policy has been fully justified by results. It is a success. It ought to have the support of such newspapers as the Kansas City Star.

For the most part the Star has been a staunch friend of national reclamation, and we are inclined to believe that there is no decided change in its attitude toward the Federal work. Its great editor, Nelson, was a personal friend, and always argued for

conservation and reclamation, the two outstanding Roosevelt policies.

Snow and cold weather have sent the price of hay steadily upward. It was selling at \$20 a ton a few weeks ago, but recently reached the \$25 mark.

L. O. Janeck, who has about 2,000 tons in the Tieton district, has been obliged to turn down an offer of \$25 a ton for the lot, or \$50,000, as there are no cars available to move the hay. "I could sell the hay, leaving it stand where it is," says Mr. Janeck, "and allowing some one else to speculate with it. I don't want to do that, however. If I had the cars the 2,000 tons would go for \$25." Mr. Janeck has already sold over 1,000 baled tons at \$23 and \$23.50. The train service has been reduced on the Tieton run along with other train reductions and only 30 cars a week are now available. This is not enough, according to Mr. Janeck, to move even a small percentage of the Tieton produce.

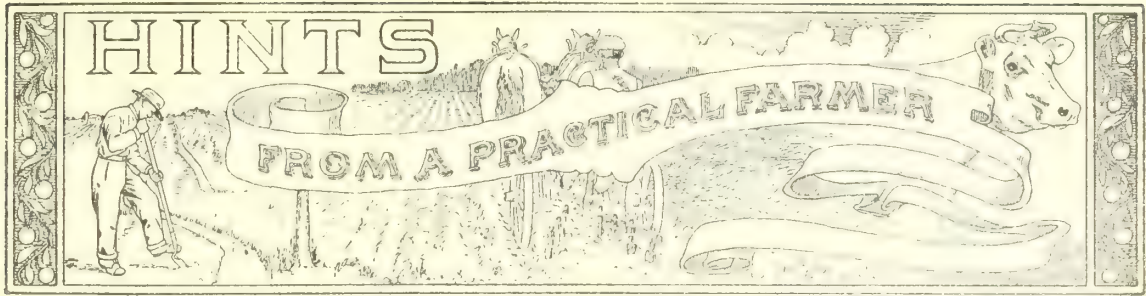
Notwithstanding the reputation of the Delicious to bear a full crop only every other year, John McDonnell, of Selah, has been able to raise, on his 1 acre planted to Delicious, a sufficiently heavy crop to net him \$2,000 per year from the 1 acre for four consecutive years. McDonnell has a ranch of 25 acres, but says the Delicious is the most satisfactory apple, from the standpoint of returns to the acre, that he raises.

Remarkable returns received by many Yakima Valley fruit growers this season are well illustrated by the case of E. E. Norton, of Grand View.

Norton last spring purchased a tract of 5.7 acres, near the lower valley town. The place, for which he paid \$350 an acre, was set to apples, chiefly winesaps. He harvested a crop that more than paid for the entire farm and the improvements he had made on it, as well as giving him a fair return for his work.

All records for acreage production of sugar beets will be broken in the Yakima Valley this year when the summary of the 1919 crop is made, according to statements made by Mark Austin, agriculturist for the Utah-Idaho Sugar Co., who, with Merrill Nibley, assistant manager, is checking up on the Yakima crop and inspecting the operation of the two new factories.

T. R. Horne, local manager, and William Gough, head of field operations, supplied the visiting officials with records of local yields that seem astonishing to them. M. Kinley on the reservation reporting 36 tons to the acre on a field of 4 acres heads the list on high yield to date. L. W. Chamberlain, of Sunnyside, who had the high record last year with over 40 tons on a single acre, comes back this year with an average yield of 25 tons to the acre on 12 acres. The factory farm at Sunnyside has an average yield of 30 tons to the acre on 5 acres.—C. J. B.



### What Helps the Farmer Most?

What extension agency is most helpful to the farmer?

Among 2,300 farmers of whom that question was asked, 38 per cent said that they received most help from the county agent and the farm bureau. The agricultural press was given first place by 31 per cent. Three per cent of the farmers interviewed said they received most help from farmers' organizations other than the farm bureau and 3 per cent said they received most help from bulletins and agricultural reports. Twenty-two per cent had no definite opinion as to which agency was most helpful to them.

An indication of the efficiency of farm-bureau work is found by contrasting the replies in States where the farm bureau is organized and in those where it is not. In the former, 66 per cent of the farmers interviewed placed the county agent and farm bureau first among the agencies that are of service to them, and only 13 per cent placed the agricultural press first. In States that have no farm bureaus, 26 per cent placed the county agent first and 39 per cent placed the agricultural press first.

Of the farmers visited, two out of every three were acquainted with the county agent and his work, and 90 per cent of them were favorable to it. One farmer in every three visited was a member of the farm bureau and one of every four was a member of some other organization.

### Lice on Hogs are Costly to Farmers.

Recent experiments prove that lice on hogs are extremely expensive. It was shown that lousy hogs not only consume more food and make less meat, but that they are uneasy or restless, a condition that doubtless lessens the pork-producing abilities of the animals. When not eating, the lice-ridden swine spent most of their time rubbing themselves or running around. If strangers came near they were noticeably excited. This did not hold true of the hogs free from lice.

Three experiments, each extending three months or more and with from 20 to 30 hogs as subjects, were conducted. In one experiment it cost exactly \$1 a

hundred pounds of pork more to feed the hogs with lice than it did to feed the clean animals. In another, it cost \$1.50 more, and in the third, \$2.94 more. The conclusion was reached that the main reason why hogs with lice consume more protein feed is due to the fact that the lice suck the blood from the animals, and the latter must use more feed to replace their losses.

But the lice-ridden hogs can not make up for the blood sucked by their parasites. For instance, at the beginning of one experiment, 15 hogs with lice weighed a total of 1,167 pounds, and 15 hogs without lice weighed 1,025 pounds. At the end of the experiment the lousy hogs weighed 2,872 pounds, and the clean hogs weighed 3,150 pounds, although the total feed consumed by the clean hogs weighed only 203 pounds more than that eaten by the animals with lice.

The Department of Agriculture will be glad to supply farmers with publications that tell how to free their hogs of lice.

### Home Fruit Growing.

Well-ripened sound fruit is healthful. It is also a valuable food. It should form a part of every meal, fresh when possible, or dried, canned, or otherwise preserved.

Home-grown fruit is desirable--

Because it reaches the family fresh and in the best possible condition.

Because the family has fruit of which it would often be deprived if it had to be purchased.

Because, if the proper varieties be selected, a continuous supply of fruit of superior quality may be secured, regardless of market prices.

Because any surplus may be sold without difficulty, or may be canned, evaporated, or otherwise conserved for use when fresh fruit is not available.

Because the care of the home fruit garden provides for spare time congenial and profitable occupation, which is in reality recreation for those who enjoy seeing things grow.

Information that will be of practical help to the beginner in fruit growing is furnished in concise form in Farmers' Bulletin 1001, Growing Fruit for Home



Use, recently issued by the United States Department of Agriculture.

This bulletin deals with the widely grown temperate-climate fruits, such as the apple, pear, peach, and plum. Lists of desirable varieties of these fruits are given for the different parts of the country.

Because of the number of fruits considered and the territory covered, cultural directions are necessarily brief, but they cover the most important general points.

### Nicotine Sulphate Checks Apple Leafhoppers.

The apple leafhopper, a destructive insect that occurs in nearly every State of the Union, may be materially checked by a single spraying with 40 per cent nicotine sulphate in the proportion of one to 1,500, combined with soap. The solution should be applied against the first-brood nymphs. The same treatment made three or four weeks earlier is effective against the rose leafhopper, though this species is seldom injurious enough to justify a special application.

The apple leafhopper causes serious injury to apple nursery stock by extracting the plant juices from the terminal leaves. As a consequence the leaves gradually become undersized and fail to function normally, thereby retarding the growth of the trees. The rose leafhopper feeds on the lower leaves and produces white or yellow spots on them.

### Overfeeding May Cause Azoturia in Horses.

The animals usually attacked with the disease known as azoturia, and also popularly designated as "lumbago" and "black water" are those that are well fed and, though accustomed to regular work, have remained idle for one or more days without corresponding reduction in rations. Among the first symptoms are a staggering of the hind parts and profuse perspiration. Usually the attack comes on suddenly soon after leaving the stable, though it may occur several hours after leaving the stable. After it has fallen, the stricken animal may attempt to rise, but will be unable to stand on its feet for any length of time.

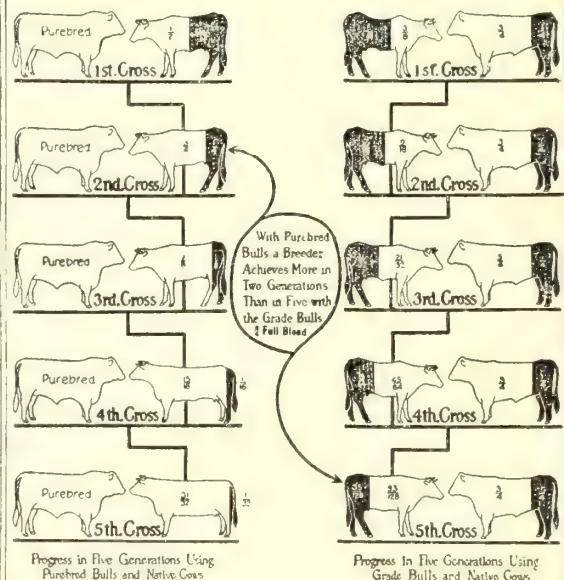
Horses attacked with azoturia should be immediately freed from the harness and bedded to protect them from injury. Especial care should be taken to prevent bruising the head. A blanket should be thrown over the animal and then it should be removed on a wagon sled or sledge to a stable, preferably a well-bedded box stall. Until the animal is able to stand it will be necessary to pass a catheter and draw the urine at least twice daily. Both treatment and nursing should be carried out under the direction of a skilled veterinarian.

Although this disease has been attributed to various causes, authorities incline to the belief that autoin-

toxication is probably the cause. This theory seems to be confirmed by the fact that the development of the disease is favored by rich feeding and a period of idleness. In any event, it is of special value to know that the disease may be prevented with the greatest certainty by reducing the ration of grain when horses are not working and by exercising them daily.

## Purebred Sires and Herd Improvement

See How Rapidly the Proportion of Native Blood (Black Portion) Diminishes When a Purebred Sire is Used.



Replace Scrub and Grade Sires with Good Purebreds

Join the "Better Sires—Better Stock" Campaign

For full information  
Consult your County Agent, your Agricultural College or  
the United States Department of Agriculture

A clean house with plenty of fresh air and sunshine is a long step in the direction of health.

The kitchen is the most important room in the house from a health standpoint. Keep everything about it and everyone in it scrupulously clean.

## BULLETINS FOR THE FARMER.

## Distributed by the Department of Agriculture.

## FARMERS' BULLETINS.

No. 1068. *Judging beef cattle*.—The art of judging is the foundation of all beef-cattle shows and is largely the means of determining the value of cattle offered in public sales. This bulletin contains a brief but comprehensive course on the various phases of the art.

No. 1069. *Tuberculosis in live stock*.—Tuberculosis may be introduced into a healthy herd by any one of several means. In most cases the outward appearance of the animal bears no relation to the degree of infection. The disease frequently develops so slowly that in some cases it may be months or even longer before any symptoms are shown; therefore be on the safe side and have your herd tested. This illustrated bulletin should be in the hands of every live-stock raiser.

No. 1074. *The bean ladybird and its control*.—The bean crop of the Southwest suffers severe injury from the bean ladybird, which sometimes ruins entire crops. The pest can be controlled, and this bulletin tells you how.

## Distributed by State Experiment Stations.

## CALIFORNIA BULLETINS.

No. 313. *Pruning young deciduous fruit trees*.—The economic conditions existing in California make it incumbent upon the fruit grower to handle his orchard so that it will come into profitable bearing at an early age. Pruning experiments conducted at the university farm at Davis show conclusively that it is unnecessary to wait seven or eight years for the first returns.

No. 314. *Cow-testing association in California*.—The cow-testing association is simply an organization of farmers who unite for the purpose of employing a trained man to weigh and test the milk of every cow in the herds of the association at monthly intervals. Thus a record of every cow in the herd is obtained at the end of the year without any trouble on the part of the individual dairyman.

No. 315. *Commercial fertilizers*.—This bulletin comprises the results of the fertilizer-inspection work of the California Fertilizer Control for the fiscal year ending June 30, 1919.

## KANSAS BULLETIN.

No. 222. *Capacity of silos and weights of silage*.—The extensive use of silos within recent years is responsible for numerous calls for information regard-

ing the capacity of silos and for the weights of silage under a variety of conditions. The occasions for the use of such estimates arise: (1) When considering the size of silo to buy or when paying by the ton for filling a silo; and (2) when buying or selling silage after it has been in the silo for some time. This bulletin contains a large amount of useful data covering these points.

## KANSAS CIRCULARS.

No. 76. *Home preparation of pork*.—The cost of meat cured on the farm is much less than that purchased from the retailer. Get this bulletin and take a crack at the H. C. of L.

No. 77. *Cattle-feeding investigations, 1918-19*.—Discusses the maximum economical utilization of silage in fattening 2-year-old steers.

No. 78. *Swine-feeding investigations, 1918-19*.—Discusses self-feeding versus hand feeding of swine in dry lots.

No. 79. *Lamb-feeding investigations, 1919*.—Discusses the feeding value of shelled corn, hominy feed, linseed meal, cottonseed meal, corn-gluten feed, alfalfa hay, and corn silage in various combinations.

## OREGON BULLETINS.

No. 163. *Sulphur as a fertilizer for alfalfa in southern Oregon*.—It has been known for many years that sulphur is one of the elements absolutely necessary for plant growth. That sulphur is often the limiting factor in crop production in southern Oregon is shown by the results obtained during the last seven years from the experiments conducted by the Southern Oregon Branch Experiment Station.

No. 165. *Finishing pigs for market*.—This bulletin was prepared with a view to putting before the stockmen of Oregon the results of the experimental work in pig feeding that has been conducted through a series of years by the Oregon Experiment Station at Corvallis and at the Eastern Oregon Branch Experiment Station at Union.

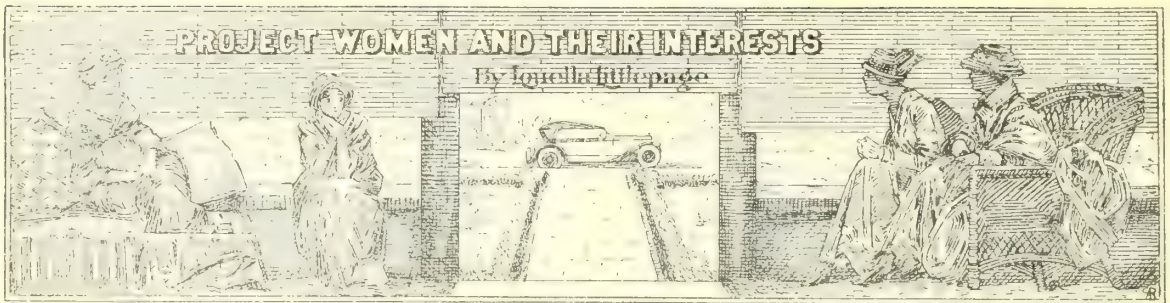
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Beauty is more than skin deep. Natural beauty is usually a sign of health that comes from keeping the body clean and getting plenty of outdoor exercise.

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A decayed tooth is far more dangerous to the health than a fly in the soup. Visit the dentist regularly. Keep the teeth clean.





### One-Third of Your Life.

At least one-third of the average human life is spent in bed, yet it is estimated that not 1 person in 300 gives more than a passing thought to the hygiene of the bedroom. There has been more or less agitation during the past decade over fresh air, and most intelligent people sleep with a window open these days, but this is only a small item in keeping the room sanitary.

A noted physician says that in the sleeping rooms of three out of five otherwise particular persons there is to the man coming in from outside a noticeable distinctive odor. He suggests that the first requisite, of course, is that the room be absolutely clean, and that pure air and sunshine should filter through the room in unlimited quantities throughout the day in addition to having windows open at night. Windows on opposite sides of the room, if possible, should be lowered several inches at the top. In winter more than in summer, one must not neglect to air the bedrooms sufficiently to get rid of the poisonous exhalations from the body or the air soon becomes very impure. To a lack of ventilation during cold weather is attributed much of the lowered vitality in the spring.

The bed coverings should be washable, comforts being furnished with removable covers. Besides being washed often, all articles of bedding should be hung on the clothesline in the sunshine. At such times the mattress, pillows, and bolsters must be beaten as well as sunned and aired. Blankets should be washed on a bright, windy day. If they are bound with cheap material that frays out rebind them with wide, loose, white braid.

Dust, on account of its disease-breeding tendency, must not be allowed to remain anywhere about the bedroom. The floors should be bare or with rugs that can be carried out for shaking and cleaning. The floor should not be swept, but cleaned with dustless mops and washed. Protect the mattress with a slip cover which may be removed and washed at least twice a year. The dust which collects on other portions of the bed should be wiped off with a cloth dampened with kerosene or furniture polish.

Never make the beds immediately after the occupant arises. As soon as the bed is vacated each blanket, sheet, etc., should be removed, shaken out, and hung where the air can circulate around it. Beat the pillows and place in an airy spot. Then open the windows and let the room air for at least half an hour. Stale water and damp towels, as well as soiled clothing should be taken from the bedroom at once.

If you have a "spare bed" do not let it be slept in until it has been tested for possible dampness by placing a mirror between the sheets. If it becomes blurred after a few minutes the bed is too damp for occupancy and should be changed or at least well aired.

### Is Your Child Getting a Square Deal?

Not long ago a charming little mother had her attention called to an article on undernourished children by a Government expert. With an indifferent glance at the caption she remarked that it really was wonderful the work that is being done for poor and uneducated people.

Now, surprising as it may seem, statistics show that the proportion of undernourished children in the better homes is large, just as it is in the homes where smaller incomes make easy living impossible. The food served in the former may cost more and be in greater abundance, but it is quite as apt to be unsuitable for a growing child.

The child improperly fed is not getting a square deal in the world, however much else may be done for him by his parents. From start to finish he is under a handicap, mentally and physically, when in competition with those who have been given the right kind of food.

While there has been a good deal of agitation about improper food for children, but little has been printed concerning the proper kind. An expert on the subject unhesitatingly states that the most important food for a child is milk. It supplies something for making muscle, something for making bones and teeth, and something that makes children grow. No child will grow as fast as he should or as well without milk. He may get fat, but fatness is not the same as strength. Unless he has milk some part of him will almost surely be weak.

Every little child should have at least three glasses of whole milk every day, and if possible four. If he has this amount of milk, and particularly if, when he is old enough, he can be given one egg yolk a day he does not need meat. Some mothers worry because they can not afford to buy meat, fish, chicken, or other flesh foods for their children, but this is quite unnecessary; in fact, they are much better off without meat, if they can have milk, and milk is almost always cheaper than these other foods.

#### HOW TO SERVE EGGS.

Some one will probably ask how the yolk of an egg should be served to a child. One good way is to add it to milk gravy. Another way is to cook it hard, salt and mash it, and spread it on bread. The mother may just as well use the white of the egg for cake or puddings. It is the yolk that the child needs, as there is something in the yolk, as there is in the milk, that makes children thrive.

Every mother wants her child to have straight, strong legs. Both milk and eggs help to make the bones strong. Children who do not get these foods are almost sure to have a disease called "rickets." Their bones being weak, bend under them and get very much out of shape.

Milk gets dirty easily and it is very hard to make clean again. It should never be left uncovered or put into a soiled vessel. Unclean milk is almost sure to make children sick. The barn where the cows are kept should be kept clean; so, too, should the pails and the milker's hands. After the milk comes into the house it should be kept carefully covered in a clean receptacle and in a cool place.

Whole milk is better than skim milk, but clean skimmed milk is better than unclean whole milk. When the mother is not sure of getting clean whole milk she had better give clean skimmed milk and a little extra butter for the fat.

The something that makes children thrive comes from the grass and other green things the cow eats. The same something in eggs comes from the green food of the chickens. The substances so much needed by all young animals is also in lettuce, spinach, and other greens. For this reason these vegetables are good for children old enough to eat them, particularly when milk and eggs are scarce.

Some children do not like vegetables, and the young mother above referred to said I simply can not make my baby eat vegetables. A good way is to put these vegetables in soups or gravies without saying anything about it. For example, make milk stews or gravies and put into them any small amounts of the right cooked vegetables that may be left over, or some fresh vegetables cooked for the purpose. Cut them fine. Here is a good recipe. With plenty of bread, a large bowl of it makes a good dinner for a child.

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#### Milk stew with vegetables.

- 1 quart whole or skimmed milk.
- 1 cut potato, cut very fine.
- A few leaves lettuce, spinach, or other greens, cut fine.
- Small piece of onion.
- 2 level tablespoonfuls butter or bacon fat.
- Salt.

Boil the potatoes until soft and drain. Cook the other vegetables in so little water that they do not need draining, but do not burn. Add to the milk, heat, and add salt.

Almost any vegetable can be used for flavoring milk stews. Or a little fish or chopped dried beet may be used. In the case of rather young children care should be taken not to serve tough foods unless the mother can watch to see that they are well chewed.

Another way to use milk is in simple puddings.

#### Rice pudding.

- |                                 |                         |
|---------------------------------|-------------------------|
| 1 quart milk.                   | Dash nutmeg or cinna-   |
| $\frac{1}{2}$ cup rice.         | mon or grated rind      |
| $\frac{1}{2}$ cup sugar.        | of $\frac{1}{4}$ lemon. |
| $\frac{1}{2}$ teaspoonful salt. |                         |

Wash rice thoroughly, mix the ingredients, and bake three hours or more in slow oven, stirring occasionally at first. Any kind of a cereal—oatmeal, corn meal, or cracked wheat—may be used in place of the rice, and molasses or brown sugar can be used for sweetening.

Fruit once a day is a good rule, and if you can not get fresh fruit use dried. Cook well. If child is young or delicate give only juice or pulp. A healthy child of school age may eat apples, peaches, plums, and oranges and other fruits under supervision.

Every child should have plenty of good bread. Whole wheat or graham bread should be given occasionally. Cereal mushes are also good for children.

Save sweets for dessert, when the child is not hungry enough to eat too much of them. A simple pudding or plain cake or cookies are good, or bread may be spread with white or brown sugar.

Breakfast may consist always of fruit, fresh or dried, with a cereal, milk, bread, and butter. Bread and milk or rice and milk are enough for supper. The chief meal should come in the middle of the day. Here are a few suggestions for it:

#### DINNER.

- Baked potatoes.
- Milk gravy flavored with bacon or salt-pork fat.
- Greens.
- Bread and butter, with sugar on last slice.
- Milk stew.
- Egg on toast.
- Rice pudding.
- Milk toast.
- Stewed celery or cabbage.
- Boiled rice with sirup.
- Potato soup.
- Bread and butter.
- Baked apples with cream.



## Rabbits.

Rabbit raising on a back-yard scale is not an experiment. Thousands of small rabbitries in this country are producing meat crops regularly for family tables. These domestic animals are easily raised and remarkably free from disease when properly cared for. With the present high prices charged for meats, rabbit breeding should reach the dignity of an important industry.

The Belgian hare is a good rabbit for table use. The New Zealand red is said to be still better. It weighs more than most breeds, develops rapidly, and the quality of the meat is superior to all the others. The Flemish giant is a Belgian hare bred exclusively for large size, with the result that the meat is coarser and less delicate in flavor. These characteristics are considered by some persons as desirable, but this is largely a matter of individual taste.

An additional inducement to raising rabbits for the table is the fact that the "bunny beef," as it is called, is delightful when canned, and the canned product can be utilized in a variety of delicious dishes. Try this method of canning either your home grown or the wild rabbits which are secured as game:

### METHOD NO. 1.

After skinning the rabbit, cool until thoroughly chilled. Cut into the usual pieces, roll in seasoned flour, and brown in frying pan just as you would spring in deep fat. Pack closely in hot sterile glass jars and pour over it the gravy from the pan. The fat need not cover it. Partially seal and process in a water bath for 90 minutes, or cook in a pressure cooker for 30 minutes. Complete the sealing as soon as the jars are removed from the water. Invert to test lids. Wrap the cool jars in paper and set away in a cool, dry place until used.

### METHOD NO. 2.

If you prefer stewed rabbit, or if you wish some of each, try canning by this method: After dressing and cooling the meat cut up in serving pieces. Fry in hot fat in a frying pan until brown but not tender. Pack tightly in hot, sterile jar. Add teaspoonful salt for each quart and cover with boiling water. Process in water bath for 90 minutes or in a steam cooker for 30 minutes. Remove from fire, seal tight, and put away wrapped in paper in cool, dry place.

Rabbit prepared in this manner makes delicious meat pie.

Try this recipe either with the canned or fresh meat:

### BAKED BUNNY BEEF.

Line baking dish with thick meat-pie crust—a rich biscuit dough. Fill with the rabbit meat, season with salt and pepper. A little onion and ground cloves are

added by some cooks. Thicken the liquid with flour, using a tablespoonful of flour to each cup of liquid. Pour into the crust and cover with top crust in which holes have been cut to allow steam to escape. Bake one-half hour. Meat should previously be cooked partially.

Another rabbit-pie recipe which would make the bulk of a meal is made by picking the cooked meat from the bones. Place in baking pan and cover with two cups seasoned mashed potatoes. Over this is poured the thickened gravy and the pie then covered with soft, rich biscuit dough. Bake until crust is done.

### RABBIT A LA MARYLAND.

This is a delicious way to serve rabbit, either fresh or canned.

Fry strips of bacon in hot skillet. Add the rabbit cut up as for frying and rolled in seasoned flour: Brown nicely on all sides. Pour over the meat the liquid in which the rabbit was canned or add hot water. Cover closely and cook slowly until tender. Remove meat. Make a rich gravy from drippings in pan and serve with boiled rice cooked flaky and dried off in the oven.

In order to vary the monotony try occasionally—

### RABBIT ROAST.

Stuff rabbit with dressing made from bread crumbs, to which 3 tablespoonfuls of chopped salt pork, sausage, or bacon, and a little minced onion, salt, and pepper have been added. Cover with a few slices of salt pork or bacon and roast brown and tender. The rabbit should be soaked in salted water for at least an hour before using.

Send in *your* recipe for cooking rabbit and any other plan for reducing the cost of living.

## To Keep Comforts Clean and Fresh.

The following suggestion is from the women's page of the Rural New Yorker:

Take a length of yard-wide cotton cloth the width of your comforts, fold in the middle lengthwise, and stitch together at each end in a French seam. Turn and baste down the long edges for a two-inch hem. Make five or seven buttonholes along each of the hems, directly opposite each other, measuring from the center evenly to within 3 inches of the ends. Slip this cover over the end of your comfort and mark on the comfort through the buttonholes the places for the buttons. The buttons when sewed on the comfort should be directly opposite each other, and sewed with strong thread through each other. Button the slip over the end of the comfort on each side and place on the bed with the slip at the head.

### An Heirloom Party.

The Rebecca Stoddert Chapter of the Daughters of the American Revolution, of El Paso, had a most interesting meeting recently when one of the members gave a talk on heirlooms. Then came the event of the afternoon, when Mrs. Bray presented a colonial tea-kettle of copper to the chapter, and it was formally hung on the crane.

A social hour followed the hanging of the kettle, when the members and guests had an opportunity of viewing the heirlooms loaned for the occasion. These antiques included the Paul Revere lantern which Mrs. Bray exhibited. Mrs. Sargent brought an invitation to La Fayette's ball in the days of 1824. There were rare shawls, samplers, and counterpanes, bits of china, and two very old Bibles in the exhibit.

During the serving of tea old-time songs were sung by different members.

### Is Sunday a Day of Rest in Your Home?

As a rule everyone but mother rests on Sunday. Why are men so hungry on Sunday? Who started the custom of extra big dinners on the day of rest? After Friday's baking, Saturday's cleaning, and the Sunday morning task of getting the children off to Sunday school and the family to church, is it surprising that one's mind will wander from the sermon to the piles of food waiting for tired hands to prepare and the stacks of dishes which must be washed before there can be a moment to rest?

Why not simplify the Sunday dinner? It must be substantial, and it must be well balanced and pleasing, but it can be simple. Consider, for instance, the following menu:

Creamed potatoes.	Peaches (canned) and cream.
Tomato aspic.	Raisin cakes.
Cold sliced ham with mustard.	Coffee.
Bread and butter and jelly.	

The cakes may be baked on Friday with the regular baking. On Saturday morning let the ham cook while cleaning. Make the aspic while preparing lunch or dinner, and boil extra potatoes. The work on Sunday will consist only in slicing the ham, creaming the potatoes, and making coffee.

### Nut-Bearing Trees.

Almost before we know it spring will be poking her pretty head around the corner and Arbor Day will be upon us with no carefully thought-out plans to greet it. The planting of nut-bearing trees is a matter that can not be too strongly encouraged among all parents and children wherever they have room to do planting. Such trees do not mature quickly, but when they do commence to bear they are exceedingly profitable.

Even though the man or woman who sets them out never lives to profit by their returns, this is no more argument against nut-bearing trees than against life insurance or any other substantial but long-time investment.

Nut-bearing trees are doubly profitable because of the nuts they bear and because of the ultimate value of the trees themselves. As regards the first point, many authorities think that the planting of nut trees ought to be encouraged until nuts are so largely produced as to become a staple article of food, inasmuch as they are very nutritious and can be substituted for meat and other foods. Even for use as a luxury alone, thousands of acres of nut orchards could be added to our supply.

The value of the trees themselves is illustrated in the case of an old Michigan farmer who, half a century ago, was barely managing to make both ends meet. He had a son, and with an eye to the future, in spite of ridicule, he went ahead and set out walnut trees on some unproductive lowland. Before the old man died the trees were yielding a profitable crop each season, and a few years ago the son sold the trees to a furniture company for \$15,000. The whole farm itself minus the trees was worth scarcely \$3,000.

The country's supply of hardwood is running low, and trees set out now will be sure of a good market when they reach maturity. The young trees are inexpensive, require little care, and contain great possibilities for the future.

If you do not care to set out a large number, why not let each member of the family plant one nut tree each year. There will be some corner of the garden or pasture where these trees will be out of the way, or they might be planted along the highway.

### These Girls Can Can.

A report from 35 women on the Lower Yellowstone project, Sidney, Mont., shows that they have canned during the past season 1,300 quarts of vegetables, 292 quarts of chicken and other meats, 1,696 quarts of fruits and pickles, and 390 quarts of wild fruits. The canning of meat was in full swing when the report was made, and it is estimated that the canned products will amount to a much larger figure when the entire output is counted up. They figure their profit at about \$2,000 for the season. Spoilage of home-canned meats and vegetables is so slight as to be almost negligible since the cold-pack method has been used, and they report that the fruit is firmer and of finer flavor when canned this way. They derive much satisfaction from the fact that with their cellars thus stocked the problem of hasty meals for unexpected company, as well as for everyday consumption, has no terrors for them, and that they are sure of delicious food with no preservatives to menace the health of their families.



### Attention, Girls!

Do you want money for clothes, for a pretty room, for an education, for a trip, to help mother, for a vacation, or any other purpose? Then read what this Mississippi girl did with a start of \$13.50, which she borrowed from a local bank:

"I am a poultry club member, and my records show that during 1919 the net profits from my chickens amounted to \$525.35."

This is the report of Valerie Henning, of Panola County, Miss., who at 16 holds the championship of her State in poultry club work. She, with six other Mississippi girls and two chaperones, recently visited Washington, D. C. The five-day trip was a prize given by Mississippi bankers and business men to the girl in each district of the State who made the largest profit in her club work.

With the money she borrowed to start this work she purchased a pen of Barred Plymouth Rocks, consisting of four hens and one cockrel. The profits from her chickens last year, her first in poultry work, were \$374, and her flock for 1919 consisted of 2 cockrels and 19 hens. By the use of trap nests and leg bands the record as a layer of each hen had been observed and only the good egg producers were kept. From January 1 to October 16 the biddies laid 2,840 eggs. Miss Henning sells nearly all her eggs for hatching purposes, but the birds she raises, aside from the culls, bring from \$15 to \$20 a pen.

The money this girl has made through her poultry work is being used to pay her way through an agricultural high school.

### A Letter from the Carlsbad Project.

"I noticed in one of the recent RECORDS an article on the steam-pressure cooker. Why did the lady cook her meat before placing in the can? Mother has always placed her raw meat in the can with necessary salt and cooked it one hour after a 5-pound pressure had been reached—no water, no previous cooking—and then flavored it in different ways when preparing it for use.

"I have just finished reading in the Chicago Daily News Secretary Lane's remarks on the fuel question, advocating power plants on the Atlantic seaboard and the use of oil.

"Seven years ago father saw a kerosene burner advertised in a farm paper, sent for prices and description; but women are more conservative than men, and after reading the circular we laid it aside. This fall father bought one—I knew it wouldn't work—and, oh, what a comfort it is! A tank, copper tubing, and an iron burner. So simple, nothing to get out of order. Put it in the stove you already have; perfectly safe and easily regulated (valves similar to gasoline stove). There is no coal to carry in or ashes

to carry out, no stovepipes to take down or soot to clean out. We heat three rooms with it. With one of these burners on your heating stove or cook stove, the coal strikes cease to be a terror."—*Mabel E. Wilson, Hopedale Ranch, Carlsbad, N. Mex.*

### Cement for China and Glass.

Into a thick solution of gum arabic stir plaster of Paris until the mixture assumes the consistency of cream; apply with a brush to the broken edges and join together. In three days the article can not be broken in the same place. The whiteness of the cement adds to its value. Mix this cement only as needed, as it will not keep.

### A Cemetery—And a Sermon.

It was a neat little country cemetery, much like most little country cemeteries, yet there was something queer about it. There was the arched gateway and the customary weeping willows by it. The clipped hedge was like most cemetery hedges. The tombstones were about the average run of tombstones. But, withal, there was something queer—even shocking. Then you discovered what it was. These were truthful tombstones. Consoling platitudes—"Too pure for earth" and that like—found no place. Instead, there were such epitaphs as these: "Mother—walked to death in her kitchen"; "Sacred to the memory of Jane—she scrubbed herself into eternity"; "Grandma—washed herself away"; "Susie—swept out of life with too heavy a broom."

The people who saw that cemetery—and there were thousands of them—may have been shocked for the instant, but they came away with the thought that one might be better for seeing such a cemetery. For, you see, it was a miniature cemetery, 3 feet square, and it was part of an exhibit at the Montana State fair. Such levity with the most solemn thing that mankind knows could not be justified merely on the theory that the things said were true—but those who saw it came away with the belief that it was justified by way of keeping just those things from being true. And that was the purpose of the exhibit, placed there by the agricultural extension department of the State Agricultural College of Montana. It was meant to emphasize the need for home conveniences, for lack of which many a farm woman has gone to her grave before her time.

There were other exhibits designed to drive home the same hard truth. One was a model showing a bleak farmhouse on a bare hill. At the bottom of the hill ran a little stream, and by the stream were barns and cattle. Struggling up the hill toward the house with two heavy pails of water was a bent old woman. And the legend was: "Convenient for the cattle—but not for mother." Then there was a farmhouse with the water supply as it should be, the woman in the

yard sprinkling her flower beds with a hose. And the inscription read: "Convenient for mother—and the cattle, too." Another model showed a kitchen as it should be, and another a kitchen as it should not be. And there was the legend: "A long-distance kitchen shortens life."

The lesson taught by the exhibit is one that the State agricultural colleges and the United States Department of Agriculture are trying to teach by every means at their command—greater convenience and a larger measure of comfort in the farm home.—*L. L.*

## A PROJECT MANAGER'S VACATION.

By Fred D. Pyle, Project Manager, Uncompahgre Project, Colo.

I must have some gypsy blood, for about every seven years my homing instincts are overcome by a desire to see some more of the world. Having by due diligence become the proud possessor of an ancient family touring car of a small but standard make, saved enough to keep my family for a month, piloted the Uncompahgre project through a most successful season, and heard the water users' board declare their intention of taking over the project, I decided to explore the Northwest by auto.

The front seat was cut down and hinged, so that a comfortable bed could be made in the car. A light 6 by 8 tent thrown over the car when needed made a fine protection from wind or rain. The grub box was well stocked with both eatables and tools; a folding camp stove, an irrigating shovel, and a rope completed the outfit.

As a 4,500-mile trip is both expensive and lonesome, a hunt was made for a companion. Every person approached wanted to go, but could not go at the time I could, until I came to H. C. Getty, division engineer for the State of Colorado. He could meet me in Rifle and go as far as the coast. Getty is a good mixer, knows everybody in western Colorado, wears a peculiar heavy gold ring, and has a few high signs, grips, passwords, etc., which appear to make him acquainted wherever he goes. But if some one does not slap him on the back every two or three hours and yell "Hello, Getty!" he gets lonesome, while my many years of experience listening to tales of graft, incompetency, lack of water, ruined crops, etc., have made me appreciate the beauties of nature. But for all that we were boon companions, could eat one another's cooking, steal one another's bedcovers, and cuss and discuss mutual friends and enemies without any serious altercations.

Throughout the trip my many years' experience in driving a car on a ditch bank, while watching for work that the ditch rider should do, keeping an eye on the condition of the crops, and conversing with a visitor, stood me in good stead and probably saved several days' time.

I once had the pleasure of taking Representative Edward T. Taylor and Mrs. Taylor over the Selig Canal when he was going to Olathe to see which of

several candidates for the office of postmaster was best qualified. On his next visit to the project, about a year later, he said, "Pyle, I had special instructions from Mrs. Taylor when I left home not to go riding with you."

As 40 days was a very short time for the trip, I passed up S. O. Harper, project manager of the Grand Valley project. I had extended Mr. Harper an invitation to go with me. He was very anxious to go, but had to stay home to shave his estimates and authorities to fit his allotment. About all I saw of his project was a Monighan walking dragline traveling along the public highway. Apparently it had just crawled out of a completed drain and was looking for a nice soft waterlogged spot to crawl into. It appeared to move very slowly, but when I stopped to watch, it was soon ahead of me. From the road could be seen tunnel, siphons, culverts, and wasteways on the Grand Valley Canal. Just before turning up Plateau Canyon a good view was obtained of the Diversion Dam, a fine piece of work in a location which sets it off to advantage.

Between Debeque and Rifle for a distance of about 35 miles are the remains of a defunct irrigation system. The canal was constructed, settlers came, failed and left, and now the old flumes, remains of houses, and stumps of trees, like scattered bones on the desert, remind one of the tragedies of life.

Supper on the Little Snake River was fine, with fried young sage chicken, potatoes, onions, bacon, toast, and tea. Later a bath in the river, and moonlight so bright we could not sleep. By daylight we were on the road, headed for my old home in western Wyoming, over 200 miles away.

We struck the Union Pacific at Wamsutter, a real railroad with heavy steel rails, fine ballast, double tracks, freight trains a mile long, passenger trains in two sections of 12 coaches each, solid mail trains, and everything moving.

Home, a good supper, and the old feather bed. When we were ready to leave on the second morning, Getty said to mother, "I wish you a long and prosperous life, but when you make your will I would like to have that feather bed; it is worth waiting for."

Logan and the Agricultural College of Utah, from which I graduated in 1903, showed wonderful im-



provements, new buildings, trees hiding the old buildings, and in town miles of paving, a good lighting system, and many new homes.

Pocatello, the sagebrush and lava rock plains of Idaho, and then the oasis at Burley. Barry Dibble, project manager of the Minidoka project, was away. I should think that after the pains I took to show him over the Uncompahgre project several years ago he would have returned the compliment. However, the chief clerk and the water master took us over the project. Uniform soil conditions, good roads, practically all land under cultivation, power lines everywhere, smoke of three sugar factories, all looked good. No barren adobe hills and very little seep in sight. The three electric pumping plants by which the project is supplied with water are models of perfection in operation and in results obtained.

There was a big county fair in progress, but we did not take it in. Since seeing Chris Picker raise enough crops of all kinds on a few acres of land at Olathe, Colo., to fill the exhibition space at the Western Slope Fair, hogging all the prizes and bringing back a bunch of silver cups from Denver, and after seeing Al A. Neale, of Montrose, bringing in some old work horses that were educated buckers, I was more interested in seeing 45,000 acres of alfalfa, potatoes, sugar beets, beans, corn, etc. When eastern farmers come to Burley and see what they raise and what it sells for, they offer so much for the land that those who developed the country can not refuse, so sell and move on west to the Boise project, where they buy another farm and start over, the only difference from the first start being that instead of owing one-half the purchase price they pay cash and have a fine bank account left to draw from.

Seven years ago when I visited Burley it was a small town of about 1,000 people, now it has about 4,000, and is growing fast. Over 100 new homes, chiefly \$3,000 to \$6,000 bungalows, have been built since January 1, 1919. And the farmer does not move to town to build either; he builds his bungalow right on the farm, where it belongs, with all the modern conveniences of a city home.

Apparently Lake Walcott, in which a portion of the water is stored, has not had its capacity decreased by silt, as the principal conversation between the Service employees and the water users was, "Yes; we expected to take the last water from the lake several days ago, and close the season, but it does not empty out as quickly as it should, and there is still several days' supply left."

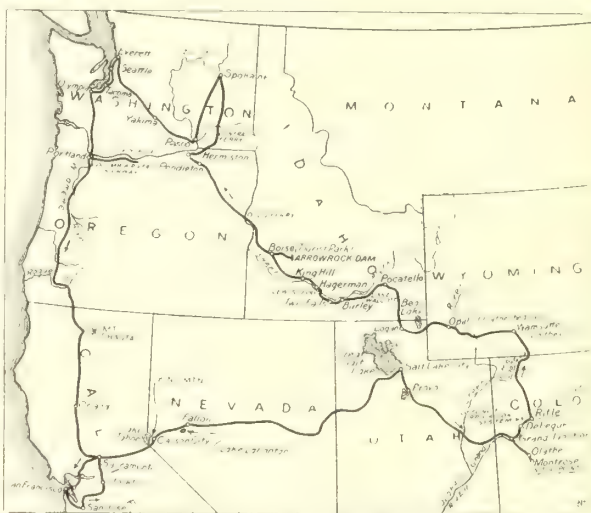
Below the Minidoka project is the great Twin Falls project, the finest, largest, and most successful private project in Idaho, so successful, in fact, that many other private projects in that vicinity not so successful have appropriated the name and added it to theirs.

Water for the Twin Falls project is diverted by the great Milner Dam, which was taking all the water

from the river except about 25 feet of leakage and spring water. Few who lived along the Snake River 10 years ago can realize that in spite of the annual storage of 840,000 acre-feet of water this river will be practically dry below the Milner Dam for a considerable period each year.

We crossed Snake River at Lewis Ferry, in the peaceful Hagerman Valley, near where Lost River pours out its flood, known as the Thousand Springs, over the lava benches high above the river—one of the most beautiful sights of the entire trip. Wonder when some engineer will locate this river flowing under the lava plains, dam it off, bring it to the surface, and put it to work furnishing moisture for crops.

Walter Ward, project manager at King Hill, was away hunting, either deer or new projects, I did not learn which. Owing to the interest taken by the Nation looking forward to providing homes for soldiers, many of the project managers have been on the lookout for new projects.



Project Manager Pyle's 4,500 mile trip.

R. B. Smith, chief clerk, explained the project system, and took us out to Camp 5, located on top of the bluffs, high above the Snake River, where they were hoisting up gravel and sand and constructing precast side slabs for flumes. This project appeared to consist principally of flumes and siphons of all kinds and of lined channel, located on the sides of lava cliffs about halfway between the river and the top.

The King Hill irrigation district operates the system, and the Government is replacing old structures with more permanent structures under contract. Watermelon patches looked very inviting, but when we learned that a young man had been killed while trespassing in one a few days before we managed to hold down our desire for melons. The men at Camp 5 had caught a 100-pound sturgeon in Snake River the Sun-

day before, which should help to reduce the deficit on the mess house for that month.

We arrived in Boise Sunday evening and found an ideal tourist park, with grass, shade trees, hot and cold water, electric plates, a laundry and shower in process of construction, and a register. The arrivals at the park are listed in the morning papers, the same as arrivals at the Owyhee. The park is about a quarter of a mile from the famous Boise Natatorium, which we proceeded to patronize.

Bright and early next morning we found J. B. Bond, project manager, in his office, and after discussing matters of mutual interest he arranged for Mr. MacLean, irrigation manager, to take us out to the Arrowrock Dam. Although I have had considerable experience with mountain roads, I was not prepared for the steep grades and narrow road leading to the dam. To add to the interest of the trip, Mr. MacLean was not thoroughly familiar with the type of gear shift on the car he was driving, and when he intended to go into low and sometimes went into reverse instead a few chills would exercise up and down my back.

The Arrowrock Dam is a substantial and beautiful piece of work. The operating galleries constructed inside the dam are unique and effective. At last the problem of handling large discharges from high dams has been solved.

The Boise project is one of the largest in the Service, and the development of the land has been very rapid. Interurban car lines, cheap power, many creameries, evaporators, etc., are rapidly adding to its prosperity. Several of the towns are making phenomenal growth, and Boise will have to wake up or it will not always be the largest project town.

A siphon under the Boise River, near Caldwell, was being constructed to divert, drain, and return water from the older portion of the project and use it on the north side of the Boise River. People who have been waiting there for water for the past 17 years did not expect it to come in that way.

We could always tell when we were on a Government project by the type of construction, the amount of water in the canals, and the Reclamation emblem, the foxtail, which grows only where there is an abundance of water.

From the top of Mission Ridge, near Pendleton, Oreg., we could see Zane Grey's "Desert of Wheat" stretching as far as the eye could see to the west, north, and east in alternate blocks of chocolate-colored summer fallow and cream-colored stubble. Pendleton was busy with her Round-up. Cowboys, Indians, and high-priced cars, generally driven by competent-looking young women, were much in evidence.

H. M. Schilling, project manager, showed us over the Umatilla project, explained the difficulties of the early settler, his present prosperity, and how the sand was sluiced from the canal system. The grounds on

this project were the best kept of any visited, and the janitor and caretaker is a wonder with flowers, reminding me of H. E. Fair, janitor at the Montrose office. The second time Mr. I. D. O'Donnell visited Montrose he wanted to know if we cleaned house every time we heard he was coming, and he was informed that we had a janitor who believed in good janitor work just as thoroughly as Mr. O'Donnell did in good farm work.

As we crossed Idaho we found that much of the farm produce was moving west to supply the coast cities, and that the price of hay was becoming higher. Forty acres of alfalfa hay produced no small income on the Umatilla project this year.

The oftener we crossed Snake River the worse conditions became. At Lewis Ferry there was a gasoline-engine-operated propeller, which put us across in fine shape. At Olds's Ferry a little rowboat, with some kind of an exhaust behind it, nosed against the ferry and shoved it across. But when we got to Central Ferry there was nothing to propel the ferryboat across. There was a high wind blowing upstream, which forced the boat upstream as far as the cables would let it go, and threatened to turn it over. We waited five hours for the wind to quiet down sufficiently for the current to act on the rudder of the boat, and by much effort finally crossed. Contracts were being prepared by the State for the elimination of this ferry by the construction of a long span highway bridge.

Spokane calls to mind a thriving city located on high hills separated by rushing rivers, waterfalls, power plants, and magnificent concrete bridges.

Pasco looked as if it had started out to be the center of a prosperous irrigation project and then found out that something was wrong. D. W. Cole, former project manager of several projects, was there to get them started the right way, and if he can just succeed as well as he can command the English language, I shall probably see a different Pasco on my 1926 trip.

Notwithstanding the fact that we arrived at the Yakima office at 8 o'clock sharp, we found Project Manager R. K. Tiffany had been gone several hours with a board of engineers inspecting conversion sections on the Tieton Canal. Mr. R. K. Cunningham, chief clerk, took me out to the work, where I enjoyed the remainder of the day along the Tieton Canal and over the Tieton unit.

The Yakima project is certainly progressive. The crops, especially fruit, alfalfa, and corn, were the best seen on the trip. The farmers appear to know it, too, judging from the price asked for land. Yakima is a real city of 24,000 population, fine paved streets, street cars, interurban car lines, paved roads, splendid public buildings, and a wide-awake Commercial Club, with \$7,000 in their treasury.

The project people were much interested in the development of new project units, especially the High-



line unit, and were pleased to have Mr. John W. Hailowell, assistant to the secretary, visit them. He was entertained by the Commercial Club and taken over the project on an inspection trip.

Besides being in charge of one of the largest projects, Mr. Tiffany takes a very prominent part in other activities, and is president or director of a number of institutions, such as the chamber of commerce, school board, etc.

At Yakima I made the mistake of leaving Getty to his own devices for a few hours, and not finding a man that knew a man that he knew, he got lonesome and left for Los Angeles, leaving a note in the grub box, which he knew from past experience was the first place I would look when I got back in the evening.

Everett, Seattle, Tacoma, and Olympia were soon passed, also the great bridge and viaduct across the Columbia River, which brought me into Portland. I soon located District Counsel H. L. Holgate. After wandering around the city several hours I went to lunch with Mr. Holgate, who rode with me to his farm. As a general rule, I enjoy picking up a fellow on the road and pumping him to learn about the country, but was somewhat disappointed in Holgate. He was either scared from my driving on a wet road or had so much legal knowledge in his head that other kinds were crowded pretty far back. He could not tell me how much the tide rose at Portland, what kind of a bird was sitting on the fence, or point out a rhododendron bush, which produces the State flower of Washington.

A most enjoyable evening and morning were spent along the Columbia River Highway, which is a fine example of what can be done in the way of fitting a permanent, practical road into the beautiful Columbia River scenery.

The Willamette and Rogue River Valleys were pleasant and prosperous looking. A frosty night spent at the foot of Mount Shasta convinced me that it was time to hurry home. A few minutes were spent at the head of the Sacramento River, a large spring in the slide rock near the base of Mount Shasta.

A. N. Burch, project manager of the Orland project, was in his office, and a few hours were spent in discussing items of mutual interest. This little project—practically an oasis on the west side of the Sacramento Valley—shows what can be done when the right combination of water, soil, and American farmer can be gotten together.

Sacramento, Oakland, San Francisco, San Jose, and Stockton were soon left behind, and I was climbing the Sierra Nevada Mountains along the old stage route from Sacramento to Virginia City.

Lake Tahoe was somewhat of a disappointment. Bear Lake, in Idaho, is much more interesting and beautiful. The timber and heavy atmosphere of the coast had prevented me from obtaining distant views of the country for many days, and when I came

around the side of King Mountain, near Carson, Nev., and could see mountains and valleys for 100 miles ahead of me I felt as if I were getting back to Colorado.

John F. Richardson, project manager of the Newlands project, Nevada, found me camped back of his office at Fallon one evening and took me home, where an opportunity to clean up, a picture show with the family, and a fine bed completed the day. I had intended going on the next morning, but did not have the heart to tell him so, and spent the day traveling over the project. Lake Lahontan, with its magnificent wasteway, was visited. I learned many things about leveling land, and Mr. Richardson something about a certain weed growing on the lawn in front of his office.

This is one of the projects where the original settler had an extremely hard and trying time, but leveling the land and increasing the acreage in alfalfa are fast bringing the project to the front, so that I had to revise my former views.

Narrow mountains with old mining camps at their ends and wide sagebrush valleys constituted the principal scenery across Nevada and well into Utah.

If J. L. Lytel, project manager of the Strawberry Valley project, is as easy for the water user to find as he was for me he must be a popular man. We met in a restaurant entirely by accident, and it did not take long for him to arrange a trip over the project. T. E. Scaife, of the Irrigation Department at Cape Town, South Africa, and his wife went with us. Mr. Scaife has had charge of extensive irrigation works in South Africa for many years, and ideas were exchanged very rapidly.

Concrete-lined canals and laterals are the usual thing on the Strawberry Valley project and unlined the unusual. The Government built the new systems and delivers supplemental water to old systems. The water users operate all systems except for the power, storage, and tunnel works.

A great change has come over this valley since I gathered information on underground water in 1904 for the Geological Survey. Slicing plants for sugar beets have developed into sugar factories, paved roads are connecting the towns, and electric power is being used by the farmers and by the towns.

A bad stretch of road near the Utah-Colorado line and a night drive from Grand Junction brought me home with a feeling that my gypsy blood was satisfied for the time being.

I found on my trip that irrigation projects having a happy combination of water, soil, and progressive farmers are a success, but that little can be done in the future without the expenditure of large sums of money; that the good-roads movement has the center of the stage in the West, where the counties have barely been able to build for the day, where the States have helped a little to build for to-morrow, and where the Nation

is now helping both the others to build for the future; that the Northwest, with its timber, fisheries, fertile soil, and protected water for shipping and available

water power, has a great future before it; and its population will provide markets for much of the irrigated land of the West.

## WHAT HAS BEEN DONE ON THE MINIDOKA PROJECT IN SOUTHERN IDAHO.

By Barry Dibble, Project Manager.

The Minidoka project is a good example of the quick returns of irrigation development. In 1904 it was an uninhabited sagebrush desert—no towns, no farms, no railroads, no facilities of any kind. All that it is to-day is the result of the construction of the irrigation works by the United States Reclamation Service at a cost of \$5,800,000. Of this amount over \$1,000,000 had been repaid by the end of 1919.

In 1919—only 15 years from the desert States—conditions are shown by the following figures collected by the local commercial organizations and compiled from the records of the United States Reclamation Service:

### Values created.

Value of farm lands and improvements on project estimated by the owners at close of 1919	\$27,336,000
Value of live stock	2,016,000
Value of farm equipment	1,021,000
Total	30,373,000

### Assessed valuations.

Farms	7,800,000
Towns	2,270,000
Public utilities	4,500,000
Total	14,570,000

### Value of crops produced in 1919.

Alfalfa	2,676,000
Potatoes	1,000,000
Wheat	835,000
Sugar beets	667,000
Miscellaneous	746,000
Total	5,924,000

Value of crops produced since 1909 (actual census)	25,000,000
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### Shipments of agricultural products, 1919.

	Cars.
Hay	3,500
Potatoes	1,200
Beets	650
Cattle	450
Wheat	350
Sugar	220
Sheep	210
Flour	170
Miscellaneous	150
Total annual shipments	6,900

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### Wholesale purchases of manufactures during 1919.

Dry goods, clothing, shoes	\$1,293,000
Lumber	1,060,000
Automobiles, trucks, etc	1,040,000
Groceries	814,000
Hardware	589,000
Coal, feed, flour, and bags	486,000
Farm implements	434,000
Machinery and supplies	375,000
Electrical supplies	279,000
Jewelry and miscellaneous instruments	249,000
Drugs and sundries	172,000
Cigars, etc	124,000
Furniture	121,000
Other merchandise	103,000

Total for one year 7,139,000

### War activities of the project.

Men in Army	1,017
Men in Navy	62
Red Cross members	4,100
Liberty loans, etc	\$1,747,000
Red Cross subscriptions	\$57,000
Subscriptions to other war activities	\$210,000
	\$2,014,000

### Other significant statistics, 1919.

Number of farms	2,208
Number of towns	6
Population	17,000
Acres supplied with water	121,000
Acres in crop	110,000
Public schools	28
Churches	25
Newspapers	7
Banks	10
Capital stock	\$345,000
Deposits	\$4,000,000
Number of depositors	11,100
Industries:	
2 sugar factories.	
3 cheese factories.	
3 flour mills.	
1 brickyard.	
1 potato-drying plant.	
2 alfalfa mills.	
1 mixed-feed mill.	
2 feeder yards, etc.	
Railroads, 52 miles.	
Electric power generated in project power house,	
10,000 horsepower.	
Pumps water for 52,000 acres.	
Supplies all towns and factories.	
Over 800 farms also use this power.	



Water supply of project: Snake River, with storage in Jackson Lake, Wyo., and Lake Walcott, Idaho. Jackson Lake Reservoir:

Capacity, 846,000 acre-feet.

Supplies storage to supplement the natural flow to 750,000 acres.

Fifth in size in world.

Jackson Lake Reservoir—Continued.

Supplies more land and protects more crops than any other reservoir.

In 1919 the land so supplied produced crops worth \$40,000,000.

Jackson Lake Reservoir cost only \$1,250,000.

Query: Has it been worth while?

## UNCOMPAHGRE PROJECT EXHIBITS AT THE WESTERN SLOPE FAIR.

By Dean C. Allison, Superintendent of Irrigation, Uncompahgre Project, Colorado.

Graphs and maps chock full of pertinent information concerning the Uncompahgre project were on exhibition at the Western Slope Fair, Montrose, Colo., September 16 to 20, where they proved intensely interesting to both visitors and local people.

The canal and lateral map, figure 1 in the accompanying illustration, shows the completed irrigation system divided into eight lateral systems: 446 miles of canals and laterals were operated by the Reclamation Service in 1918. At the southeast corner of the project water from the Gunnison River is brought under Vernal Mesa by the Gunnison Tunnel to the South Canal, which in turn delivers it to the Uncompahgre River, from which the various canals divert.

The elevation of the valley ranges between 4,500 and 6,500 feet. It is entirely surrounded by mountains with elevations of 9,000 to 13,000 feet, which give the valley the appearance of a flat-bottomed bowl when viewed from the surrounding foothills.

As an irrigation system is constructed for the sole purpose of delivering water, and as the amount of water delivered is of vital interest to the farmer, figure 2 attracted the most attention. This graph shows that the Service delivered 44 acre-inches of water in 1908, which increased to 77 acre-inches in 1918. This, combined with the annual precipitation of 11 inches, brought the amount of water up to 88 acre-inches for the season of 1918.

Figure 2 also shows that the project farmers used nearly three times as much water as falls in Iowa and more than twice as much as northern Colorado irrigators use; and that the project delivers three times the amount needed for good farming under humid conditions, and five times the amount necessary for plant use, provided the crops could obtain all the moisture. The gravel and shale subsoils of the land irrigated cause much of the loss, but this is by no means responsible for all the extra water used.

Figure 3 shows the total rainfall and the amount of water used during the irrigation seasons of the past five years. It should be noted that the bulk of the water is delivered in May, June, and July, and that during the last three seasons the delivery has averaged about 16 acre-inches each month. In two months it was as much as is used for successful crop production in the Imperial Valley, where the temperatures are extremely high, with an annual rainfall of only 3

inches and an all-year growing season.

The continuous-flow system of water delivery used is the cause of much waste and of the oversaturation of the ground irrigated. If water could be sold and delivered on an acre-foot basis as it is used, there would be an incentive to save. Even if the total cost for the season were the same, it is probable that there would be a great saving in water, and that the maintenance cost would be reduced.

Figure 4 shows the water-logged areas of the project. Notwithstanding the large amount of drainage being done by individual farmers, the water-logged area is spreading each year, generally over the best lands. It is now equivalent to 27 per cent of the cropped area. The water-logging of land would be checked to some extent by better use of water by the water user.

Although good service is the first and most important factor with the water user, the delivery cost is also a matter of great moment to him. This cost is shown in figure 5. Of the different items shown the maintenance cost is the largest, amounting to 48.8 per cent. The operation cost, which is 14.5 per cent, has varied only slightly during the past five years, but the maintenance cost has increased each year, due to the number of old ditches taken over and repaired each season, extra-heavy water delivery, and the ever-increasing cost of labor and materials. A canal system is no different from other carrying systems in that an extra load carried combined with good service will add to the cost.

Delivery of 115 per cent, 125 per cent, and even 200 per cent of water is made to a large number of the users during May, June, and a part of July. Extra water is carried to such an extent that some of the riders think their troubles are over when the head is cut to 100 per cent, thus relieving the laterals of the extra pressure. This condition does not exist on the Montrose and Delta or West Canal systems, because the land under these systems is nearly all in cultivation and the canal capacity is nearly reached when carrying 100 per cent.

Figure 5 also shows the increase in the operation and maintenance costs and returns and in the construction returns, which, under the present plans, will commence in 1922 and end in 1941. The small payments to be made during the first six years would be materially increased if the water users had to pay 6 per





cent interest on the indebtedness, as many under other irrigation systems are doing. The yearly construction costs are shown as commencing in 1902, reaching the maximum in 1906, and ending in 1921.

The yearly crop values shown in the graph are extremely illuminating as each year's crops for 1917, 1918, and 1919 were conservatively worth \$3,000,000. The gross crop value for two seasons thus equals the entire cost of the project, demonstrating that success-

ful crop production has unquestionably been realized by the project farmers.

Figure 6 shows the relative acreage and value of crops grown during the last six seasons. In value, potatoes, alfalfa, and wheat take the lead, as they do in area, only in a different order. The number of crops successfully grown compares favorably with any other irrigated section and accounts for the general prosperity of the project.

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### ERADICATION OF JOHNSON GRASS.

By Austin D. Crile, LL.D, President, New Mexico College of Agriculture and Mechanic Arts, State College, N. Mex.

Johnson grass, once cultivated as a forage crop, has become one of the major pests under the Reclamation Service projects in New Mexico. There have been some who have apologized for the Johnson grass, and there are some who have deliberately sown it to grow it as a forage crop. There may be some excuse for this practice in range pastures, perhaps in a low draw where there is considerable water and where no other agriculture would be attempted. There are portions of Texas where Johnson grass has been of very decided commercial value to the ranchmen, but as for the farmer he wants none of it.

It spreads by its seed falling on the ground. It is possible that it can be blown for some distance by the wind, and, worst of all, it can be carried by the irrigation waters. It also spreads by means of root-stocks, but such spread is not very rapid. The first year of its growth its root system is shallow, and it can easily be eradicated; and the farmer who is wide-awake will always cut out, with but one stroke of a hoe, the young Johnson grass plant, thereby settling a lot of future trouble. "A stitch in time saves nine" was never more truly said of anything than of the getting rid of Johnson grass.

Every farmer who wishes to be free of Johnson grass should watch every stalk that grows on his place as carefully as the head of the house would guard against burglars entering his home. It is a very serious thing. The real problem presents itself when the whole farm becomes infested with this vigorous plant. Its roots go very deep and very wide. You may chop it off, plow it up, leave it on top or turn it under, and you still have Johnson grass. If you were to take it out by the roots, your neighbors might suspect you of trying to mine coal by the way you would dig into the earth, and the expense of this procedure is entirely too great. Of course, it is physically possible to dig up Johnson grass roots, sift them out of the soil, throw them in a pile, and dry and burn them, and you are rid of Johnson grass; but the expense of doing this is such that you had just about as well sell out and go and buy over.

Under irrigation projects, if the water were withheld and you had no rainfall, you might, in the course of one or two years, dry out the Johnson grass. In the meantime you would have lost all returns from your farm.

How, then, can one control the Johnson grass and continue to farm his land? This is the real problem. From some experience that I have had and observation that I have made, if I were confronted by a farm full of Johnson grass I would proceed on the following plan: Where the infection was least I would plant corn, cultivate the corn carefully; and where I could not keep the Johnson grass cultivated out I would hoe it out and retard its progress and grow my crop. Then, where the Johnson grass was thickly set I would plow the ground in the fall, and when it was plowed up I would turn into the plowed field a goodly number of hogs and give them only a little supplementary feed in the way of corn; so that by hunger they would be driven to cultivate a taste for Johnson grass roots, which they will relish, thus having them pick out all the roots on the surface and root out many that are deeper down. I would then—in the warmer portions of the irrigation belt—plant the field to San Luis Valley peas the latter part of January or the first of February. The pea, being a cold-weather crop, will grow; and the Johnson grass, being a warm-weather crop, will not grow. In this way the San Luis Valley peas will make a heavy stand and should be 6 or 8 inches high before the Johnson grass starts to grow in the spring. The San Luis Valley pea would thus crowd out and retard the growth of the Johnson grass until the maturity of the peas, which should come some time in early June. I would then pasture the peas with hogs, which will fatten on the pea and will yield a good profit on the crop.

As soon as the peas were pastured off I would again plow the ground, turn in hogs to eat up the Johnson grass roots, and follow in the fall with a thick planting of rye. The rye, being a cold-weather crop, will again suppress the Johnson grass for the fall and spring, and ordinarily your control would be such

that the remaining trouble of eradicating the grass would be a matter of precaution more than a great expense. In this manner you would have constantly kept your farm in crops and produced income from your land.

Along the fences, on the irrigation ditches, and generally over the farm, where practicable, I would keep a flock of sheep, and keep them in such condition that they would eat every young stalk of Johnson grass that showed up. By means of the sheep's eating the Johnson grass, the cold-weather crops, and the hogs' working on the body of the field, one ought to be able to eradicate Johnson grass and at the same time have a reasonable income from his farm.

Then precaution must be taken along the public highways and on the main laterals and canals that the weeds are destroyed, and for this purpose a goodly number of sheep will always be profitable and very efficient in cleaning out the pest. No plant will long survive that can not make a growth above ground; and the secret is to crowd down Johnson grass with

cold-weather crops, because you can not crowd it out with warm-weather crops, and then, by using hogs and sheep, prevent its growth and seeding. Persistency in this matter over several years will clear the place, and during the time of clearing you would have made good profits. The deep plowing, San Luis Valley peas, and pasturing of hogs and sheep will add fertility to the soil and put it into good mechanical condition for further cropping.

After the Johnson grass has been reduced in this way until but a very small amount remains, alfalfa sown in the field with a nurse crop of rye will then have sufficient start that the use of a hoe here and there where the Johnson grass shows and the digging out of a root will accomplish the final results.

The two principles in eradicating Johnson grass must be the cold-weather crop and the hog and sheep. I am satisfied, by observation and experience, that this program, carried out carefully and persistently, will remove the pest and at the same time produce an income from the farm.

## THE YUMA MESA RECLAMATION AUCTION.

By Dr. J. H. Metzgerott, Washington, D. C.

On December 10, 1919, and several days thereafter, at Sunset Park, in the city of Yuma, in Arizona, it was my good fortune to attend the Government auction—the first of its kind—of an area of land of some 6,000 acres embraced in a United States reclamation project. This land, situated about 12 miles from the place of sale designated officially as Unit B, Yuma Mesa, is to be reclaimed by water derived from the Colorado by means of a pumping plant yet to be installed, which will lift the water some 200 feet upon the mesa from an extension of a larger canal now irrigating the Yuma Valley. Of this land it has been said that it represents one unit of some 50,000 acres, all of which the Government hopes eventually to reclaim. This fairly level table-land stretches southward almost to the border of Mexico beneath what might be termed an ever-present sun. It is a sandy-lime formation of considerable depth, is almost entirely free from alkali, and is extremely rich in all soil requirements except that of humus, which is easily remedied. By Government and State experts and disinterested nurserymen it has been pronounced as probably among the best, if not the best, land in America adapted for the culture of citrus fruit, dates, and figs, not only by reason of the chemical constituents of the soil but especially on account of the absence of injurious frosts. Indeed, the claim has been made that it is the only frost-free land in the United States. Some of this land not included in this unit, but none the less an integral

part of the same, has been reclaimed and planted to fruit trees for a period of 25 years. Notwithstanding repeated absence of water for intervals as long as three years at a time, the orange, lemon, grapefruit, dates, and other trees have continued to grow and produce—not as much, of course, as they would with care, but wonderfully none the less. This is perhaps one of the most remarkable features connected with the land, that the trees under such grueling conditions have survived. But the best recent evidence of the possibilities and of the productiveness of the land in question is to be found in the 3½-year, 20-acre grapefruit and orange grove which this year produced a remarkable crop of considerable size and of an unsurpassed quality of fruit. It is common knowledge that all of the oranges were disposed of at the price of \$6 per box. In this same young orchard the writer saw a number of grapefruit trees bearing at this unusual age as much as two boxes or more of perfect fruit.

Coming a distance of nearly 3,000 miles to attend this sale, I had read much and familiarized myself with everything pertaining to the area, notwithstanding the fact that as a boy I had been in close proximity to the locality many times. I had heard repeatedly of the wonderful date farm in the Yuma Valley, which is now being enlarged by the State, and which is situated immediately at the foot of the Yuma Mesa, an elevation for the most part rising gradually, at times abruptly, and occasionally almost



perpendicularly from the valley below. In a semi-official brochure I had encountered the startling statement that the date farm was producing dates at the rate of not less than \$30,000 per acre. Having since visited the grove, I shall not dwell upon the accuracy of the startling assertion. I will simply state that based upon lead-pencil calculation it is probably true, but based upon practical experience it is somewhat of an exaggeration. None the less, date culture must be enormously profitable, for I saw many date trees upon which there were from 300 to 400, possibly 500 pounds of fruit; many of the clusters, the size of bushel baskets, were so heavy that they were supported with stout twine, and in some instances by temporary scaffolding. The fruit-laden date trees were beautiful to look upon—incomparably so. They were laid out in broad avenues, the large, brownish trunks forming colonades, reminding one of Grecian architecture, and the luxuriant green foliage of sway-



BIDDERS AT THE YUMA MESA SALE

ing leaves ever suggesting the gentle billows of the sea. I do not know what they call the golden yellow branches arising body high from the sides of the trees, six and more in number, which support the huge clusters of dates, but I can at least make an inadequate attempt to describe them. Conceive of a tapering arm of the above-mentioned bright yellow color terminating in hundreds of slender elongated fingers of the same hue and picture upon each of these golden fingers, 2 and 3 feet in length, dates clinging overcrowded (persimmon fashion) in pairs one upon the other up to their very end, and picture such clusters lying layer upon layer upon other clusters and you will have a fair idea of this wonderful date-carrying appendage with its burden of delicious fruit. I say you will have at least a conception of this golden outstretched hand contrasting so markedly and gloriously with the green, glossy, foliage of the tree itself. Because it really and truly reminds one for all the world of an outstretched arm and overfilled palm, the tree has taken its appropriate name, the Palm. That land possessing such possibilities as the Yuma Mesa

should attract far and wide attention is not to be wondered at.

The land offered for sale had been divided into tracts of 5, 10, and 20 acres each, the unirrigable and undesirable portions being eliminated and 160 acres of choice land set aside for a Government experimental station to be devoted exclusively to agricultural matters pertaining to the mesa itself. To me the auction was one of the most inspiring things ever witnessed. It was typically American, and on this occasion no one could accuse the Government of favoritism. Everyone attending the sale was given the opportunity to buy, and everyone desired the other to have just what he wanted. There was no discrimination. With a cane used as a pointer the auctioneer would indicate upon a sectional map in clear view of the assembled bidders, hailing from every part of the country, the particular lot offered for sale, and unless it was on the partly completed boulevard or a contemplated cross-road the bid was at once accepted and another lot immediately offered. Men, old and young, bought these units; women likewise. All came looking serious; all departed smiling and satisfied. The only qualification demanded of the purchaser was that he or she was an American citizen, and no one was allowed to purchase more than 40 acres in the aggregate. Four deaf mutes bought 60 acres. A California banker from San Diego, a citrus expert, purchased a hundred for himself and friends, which they purposed to lay out in a single grove, and my son, an Army officer from Camp Grant, bearing a power of attorney, purchased 60 acres for himself and his overseas fellow associates, who were unable to be present but who had done their bit and were now looking forward to peaceful times, when they could increase their incomes cooperatively in more prosperous days than they have ever known.

### COST OF DISCOVERING AMERICA.

The following is extracted from the illuminating pages of our esteemed contemporary, the Land Service Bulletin, published by the General Land Office, under the able editorship of Mr. S. V. Proudfit:

"In these days of the high cost of field exploration, examination, and survey it is refreshing to reflect upon the figures given in some old documents recently discovered in the archives of one of the museums of Genoa, Italy. It would appear from these figures that the operating expense, including the cost of equipment, of discovering America was about \$7,000. The value of Columbus's fleet is given as \$3,000, which is about the cost of two of our light capacity motor trucks. Columbus's compensation, presumably with reimbursement for the actual cost of subsistence while

connected with the work, was \$300 a year, while his two captains received a salary of \$200 a year each. The members of the crew, so the record shows, were

paid \$2.50 a month. Ye gods! Imagine the cost per unit of this 'exploration survey' if computed on a mileage or an acreage basis!"

## BOISE VALLEY'S MARVELOUS DEVELOPMENT.<sup>1</sup>

By James R. Stotts, Boise, Idaho.

Overnight, as it were, the Boise Valley has been transformed from a desolate sagebrush desert into one of Uncle Sam's best advertised agricultural sections. In less than a decade the greater part of it has been reclaimed, and to-day, with the exception of the Black Canyon project, which comprises something like 100,000 acres, the last vestige of frontier days has disappeared and, tickled by water from one of the best irrigated systems in the Nation, it presents instead all the attractiveness of a vast inland empire, fraught with bewildering possibilities. Indeed, the primitive conditions of the valley have been marvelously changed. The wonderful progress which it has made in its brief period of history not only reflects its agricultural potentialities, but it also portends an early realization of the old historical forecast of early days that "Westward the Course of Empire Takes its Way." The trend of development is indicative of the passing of "the old West" and the birth of "the new West." Over the horizon but a short distance ahead and this side of "the Rockies" are "new Chicagos," big manufacturing industries, great financial centers of large proportions, divorcing us from dependence upon those of the East. Ten years ago the citizens of the valley were living off each other or off the "tenderfoot," who occasionally wandered this way from the East. Not so to-day. The valley has gotten down to a producing basis. From it there were shipped to the markets last year grain, live stock, and other farm products to the value of \$50,000,000, and the shipments of this year promise to be of a still greater valuation. Through the bumper crops of the last few years there is a plethora of money. Farmers travel in automobiles and pay by checks. Modern farm homes and spacious barns have replaced the old pioneer shacks and stock pens. Deposits in the banks of the valley to the amount \$22,069,812 evidence the prosperity of the farmers of the different communities. Of this total the deposits of the different cities and towns are as follows: Boise, \$13,000,000; Caldwell, \$4,052,000; Nampa, \$2,672,812; Parma, \$700,000; Meridian, \$625,000; Middleton, \$230,000; Wilder, \$220,000; Star, \$220,000; Eagle, \$200,000; Kuna, \$150,000. In 1918, 5,000 carloads of live stock, grain, dairy products, hay, clover seed, honey, poultry, potatoes, and other farm products went out to the markets. In 1919 the total was still larger. From

Caldwell alone, from January 1 to November 1, 1919, there were shipped out to the markets 2,100 carloads of live stock, grain, potatoes, and other farm products; 1,000 carloads of these shipments went out since July 1.

### LARGE SHIPMENTS.

The shipments from Nampa have been almost as large, and from Meridian approximately 500 carloads of grain and live stock have been shipped out. Shipments from Parma and the other towns have been correspondingly great. From the two counties of Ada and Canyon, which constitute the valley, 4,000,000 bushels of wheat were harvested in the year 1919. The revenue from the potato crop in the widely famed Deer Flat potato belt, near Caldwell, closely approached \$1,000,000 in valuation, and the industry there is held to be but in the infancy of its development, because of its superiority over all other potato belts in the United States. After having been engaged in the industry at Greeley, Colo., six years, C. F. Oellien, one of the prominent growers of this sector, closed out his Colorado holdings and located in it following a careful investigation of the local sector. In comparing the two belts, he says: "To begin with, owing to climate conditions, there is a better growing condition for the crop here than in the Greeley country. Then, as a consequence of the superior climatic conditions we have here a better marketing condition, as we are enabled to plant earlier and our crops mature earlier than do the crops of the growers of the Colorado sector. The average yield per acre here is about 150 sacks, or 300 bushels, while in Colorado, 100 sacks, or 200 bushels, per acre is a strong estimate. Unquestionably, the soil here is better and more adapted to the production of the crop. I regard the future of the industry in this section as great." This year Mr. Oellien had a crop of 62 acres from which he marketed approximately 9,000 sacks, realizing a revenue of \$19,000.

### DAIRY PRODUCTS.

Dairy products are being purchased by the creameries and cheese factories to the value of approximately \$3,000,000 annually. The farmers of the Meridian country alone are being paid by the mammoth cheese factory at that place for milk with which to manufacture the cheese which it is shipping to all parts of

<sup>1</sup> Reprinted, in part, from the Evening Capital News, Boise, Idaho.



the United States the handsome sum of \$264,000 a year, and from January 1 of the year 1919 to the 1st of October the Boise Cooperative Creamery Co., which operates this industry, paid out for milk for it and its other cheese factories at Eagle, McDermott, Ustick, Kuna, and Bowmont the sum of \$507,025.68. The condensary at Nampa, the second largest of the 20 condensaries owned and operated in the United States, is also paying out about \$1,500 a day for milk purchased from the farmers of the surrounding country, and it is estimated that the purchases of the creameries there will bring the total dairy products expenditures of that city up to \$2,000 a day. Star is expending about \$400 a day for milk and cream. The old milk pail is coming into use everywhere, and though the industry is but in its infancy, it is obvious that dairying is destined to be the dominant industry of the valley. No other section in the United States is more adapted to this industry than this, perhaps, because of its wonderful blue-grass pastures, said to excel even those of the blue-grass regions of Kentucky and its mild climate, where the weather seldom goes below the zero mark.

#### INDIVIDUAL ILLUSTRATIONS.

Illustrative of the profitable returns of the industry it may be noted that H. A. Wines, a dairyman near Boise, sold 299 pounds of butter fat from his herd of 11 cows, receiving for it the handsome sum of \$215. He estimated that the cost of feed amounted to \$6 a head, which left him a net revenue of \$149, or a net return per cow of more than \$14. Scores of other farmers are doing as well. Correlated with this industry are the industries of general agriculture and live-stock raising, and in no other section of the United States, perhaps, has greater progress in these industries been made, considering the number of years each has been settled, and to the cooperation of farmers of its different parts through farm bureaus is this progress to be credited. Both Ada and Canyon Counties have bureaus ranking with the best in the Nation, and that of Canyon County has the distinction of being the second largest in the United States. It has constantly been gaining new force for the last two years and is now composed of something like 1,000 farmers working shoulder to shoulder for agricultural advancement and the injection of more scientific methods in farming. Regularly held institutes, affording instruction in all phases of farming and live-stock raising, have followed, and in the wake of these institutes have come increased crop yields, better live stock, and the general upbuilding of the farms.

#### LEADING FARMERS COMMEND.

In commenting upon the great work of this organization C. Ben Ross, of Parma, one of the leading

farmers of Canyon County and chairman of the board of county commissioners, says: "A tremendous change in the farms of the different communities has followed the efforts of our farm bureau. We have gotten out of the old ruts. Scientific methods have come into use as the result of our institutes. The soil of the farms is better. Scrub stock in all of the communities is fast being replaced by the best of pure-bred stock. The yield of wheat now ranges from 50 to 80 bushels per acre, 50 bushels being a good average. As a clover-seed producing section Canyon County takes high rank, and the same is to be said of it as a potato belt. All these things have come through the application of scientific methods. Nor is our work ended. To the contrary, we have but commenced it. Big things are still ahead of us, and much encouragement is to be had from what has already been accomplished. With all the farmers of the county participating in its educational meetings, it stands to reason that continued progress is certain."

#### ONE OF BEST SECTIONS.

Bumper crops have naturally followed in the wake of scientific farming and brought a phenomenal prosperity to those engaged in it, and though a comparatively new country, 273,000 of its 350,000-acre area having been reclaimed through the Boise project less than nine years ago, the valley to-day ranks as one of the greatest sections of the great West. There is a plethora of money. It is cheap everywhere. Hundreds of farmers have realized from the crop of a single year the full valuation of their farms. Concrete examples are to be found in every community. The most skeptical can not doubt. In the widely famed Wilder wheat belt the wheat crop went as high as 80 bushels to the acre this year, and throughout the valley the average yield was about 50 bushels. Forty acres on the farm of W. B. Mitchell, near Parma, yielded 2,800 bushels of the "Jenkins Club" variety. In the Wilder belt, Col. Amos Miller secured a yield of more than 50 bushels, and Jack Harrington, of Caldwell, who owns a farm near the city, secured the same yield. F. A. Powers, residing near Parma, secured a yield of 80 bushels to the acre. John L. Waggoner, of the Meridian country, went to 50 bushels to the acre. W. J. Evans, in the Ten Davis community, had a yield of 51 bushels to the acre.

Potatoes in the great Deer Flat belt produced as much as 600 bushels to the acre, and practically all of the growers of that sector raised 300 bushels to the acre. Clover seed likewise brought in a wonderful revenue in 1919. The shipments from Nampa have reached a valuation of \$197,400. Those from Caldwell have gone to \$185,250 and those from Meridian to \$100,000. William Mooreland, a prosperous Meridian farmer, secured a crop of 240 bushels of red clover from a crop of 40 acres, which brought him in a reve-

nue of \$6,768. Dennis McFarland, another Meridian farmer, secured \$2,000 from a crop of 17 acres. J. H. Trout, of Parma, realized \$3,747.60 from a crop of 10½ acres. John Shuler, another Parma farmer, secured 45 bushels from 3 acres of land, which brought him \$1,349.40. From the alfalfa seed grown on 13 acres of land, A. E. Dunn, of near Parma, realized \$2,509.35. From 3½ acres of red clover seed Walter B. Mitchell, of Parma, secured 42 bushels of seed, which he sold for \$1,222. Elmer Jackson, a farmer residing near Ustick, realized \$1,100 from a crop of 5 acres.

#### MONEY IN FRUIT.

The fruit crop of the valley brought in a wonderful amount of money in the year 1919, more than 3,000 carloads having been shipped out to the markets. Lafe Boone, one of the best-known prune growers of the valley, whose orchard of 30 acres is between Boise and Meridian at Ash Park, has realized \$25,000 for his crop of Italian prunes. This means a revenue per acre of more than \$800.

From an orchard of 13½ acres Dr. C. D. Ponds, of near Caldwell, sold an apple crop for \$4,050, a return of more than \$300 per acre. From an orchard of 17 acres near the city C. T. Hawkes has marketed a crop for a sum in excess of the valuation of the farm. Henry Richards, of near Nampa, sold a crop of apples from an orchard of 31 acres for \$14,167, making him a net return per acre of \$457. More than 3,000 carloads of live stock, grain, potatoes, and other farm products will go out over the Seebree Electric Line, which operates from Caldwell. Melba, Bowmont, and other communities near Nampa are likewise productive of wheat, potatoes, alfalfa, and fruit. One hundred carloads of apples have been shipped from the Wilson orchard, near Nampa, the largest commercial orchard in southern Idaho. From 8 to 10 tons of hay per acre are produced annually in the Melba and Bowmont communities.

#### AN ELECTRIFIED VALLEY.

From an electrical viewpoint the valley is one of the most highly modernized farming sections in the United States. It is traversed by the Interurban Electric Railroad from Boise for a distance of 30 miles, making a total circuit of 60 miles and practically bringing every farm home within this circuit to the city and giving them all of its modern conveniences. Eight hundred homes in the different parts of the valley are now electrified and utilize electricity from the plants of the Idaho Power Co. for lighting, washing, ironing, pumping, churning, and in many of them it is also used for cooking.

#### "FORWARD" THE SLOGAN.

To be sure, progress has lifted her magic wand above all the communities, and everywhere the word

is "Forward." More than \$700,000 was expended in buildings in Nampa in 1919, and considerably more than \$500,000 in Caldwell. Municipal improvements in both Caldwell and Nampa are being done to the extent of about \$250,000. Building expenditures in Meridian in 1919 almost reached \$100,000. Modernly constructed highways, comparable to the best to be found anywhere in the United States are on the program of the immediate future. Ada County recently voted road bonds to the amount of \$1,000,000, and the Nampa highway district voted highway bonds to the amount of \$500,000. All told, something like \$1,750,000 will be spent in the counties of Ada and Canyon for road improvement. It is not strange that the future is viewed with complacency. Things which were considered iridescent dreams a few years ago have already been accomplished. Not all the citizens of Boise Valley realize the magnitude of the development which has come to it within recent years. The major part of its progress has been made in the last five years.

#### THE LAND OF PROMISE.

To borrow an expression from Earl Wayland Bowman, one of Idaho's most pleasing writers, "God was in a good humor when he made the Boise Valley," for when the drought-stricken regions of other States sadden the hearts of all who behold their devastating work the evergreen blue grass of the valley always presents a restful view. Indeed, the great Arrowrock Dam, the scientific wonder of the age, completed less than eight years since, stands out for the protection of the farmers like the fortress of Gibraltar and enables them to water their growing crops at will. In 1919 alone it is said that it has saved its cost of \$7,000,000.

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Germ diseases kill off more people than the deadliest wars. In 1917 pneumonia and tuberculosis killed 223,000 Americans—more than seven times the number killed in action in France.

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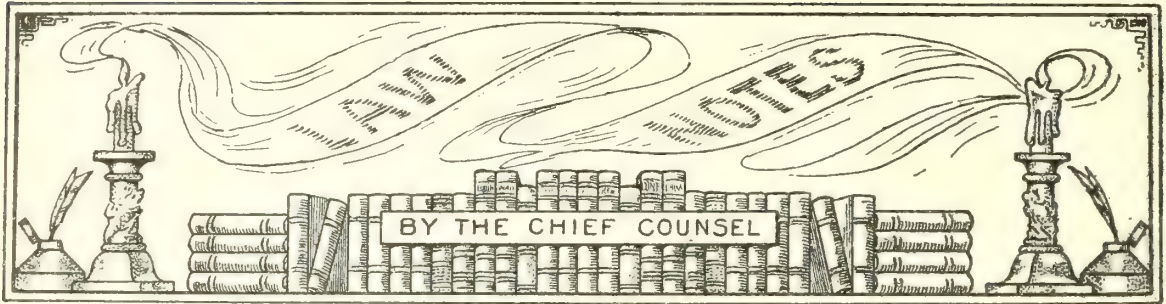
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Carelessness with the hands and teeth causes more deaths in America every year than carelessness with motor vehicles. Keep the hands clean, free from germs, away from the mouth, and visit the dentist regularly.

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Do not take drugs to cure the headache. Consult a physician, a dentist, or an oculist, to see if the cause can be located. Often the eyes or the teeth may be at fault.





### Private Appropriation of Water of Drainage District not Permissible.

Under the Drainage Act of Arizona (ch. 5, title 55, pars. 5427-5509, Civil Code of Arizona, 1913), providing for the organization of drainage districts, with power to acquire lands for canals and ditches, and expressly directing that the legal title to all property acquired by a district under its provisions, "including all waters collected in, controlled, or handled by means of any drainage works constructed or acquired," shall immediately vest in the district, the waters in such a canal or ditch are not subject to private appropriation under the laws of the State, but may be sold or otherwise disposed of by the district to carry out the purposes of its organization. (*Wattson et al. v. United States*, 260 Fed., 506.)

### Entries Within Former Fort Peck Indian Reservation.

AN ACT Providing additional time for the payment of purchase money under homestead entries of lands within the former Fort Peck Indian Reservation, Montana. (Act Dec. 11, 1919, Pub. No. 97, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That any person who has made homestead entry under the provisions of the Act of Congress approved May 30, 1908 (Thirty-fifth Statutes at Large, page 558), entitled "An Act for the survey and allotment of lands now embraced within the limits of the Fort Peck Indian Reservation, in the State of Montana, and the sale and disposal of all the surplus lands after allotment," may obtain an extension of time for one year from the anniversary of the date of entry last preceding the passage of this Act within which to pay the one-half of the installment then due or such part of any preceding installment, where payment has not been yet made and where an extension of time therefor is not authorized by the act of Congress approved March 2, 1917 (Thirty-ninth Statutes at Large, page 994), by paying interest at the rate of 5 per centum per annum on the sums to be extended from the maturity of the unpaid installments to the expiration of the period of extension, the interest to be paid to the receiver of the land office for the district in which the lands are situated, within such time as may be prescribed for that purpose by the Secretary of the Interior: *Provided*, That the one-half of any installment which becomes due within one year from the passage of this Act and for which an extension of time for payment is not authorized by the said Act of

March 2, 1917, may also be extended for a period of one year by paying interest thereon in advance at the said rate: *Provided further*, That any payment so extended may thereafter be extended for a period of one year in like manner: *And provided further*, That if commutation proof is submitted, all the unpaid payments must be made at that time.

SEC. 2. That moneys paid as interest provided for herein shall be deposited in the Treasury to the credit of the Fort Peck Indians, the same as moneys realized from the sale of the lands.

SEC. 3. That the failure of an entryman to make any payment that may be due, unless the same be extended, or to make any payment extended either under the provisions hereof or under the provisions of the said Act of March 2, 1917, at or before the time to which such payment has been extended, shall forfeit the entry and the same shall be canceled, and any and all payments theretofore made shall be forfeited.

### Reimbursement for Erroneous Payments to the Land Office.

AN ACT To amend an Act approved March 26, 1908, entitled "An Act to provide for the repayment of certain commissions, excess payments, and purchase moneys paid under the public land laws." (Act Dec. 11, 1919, Public No. 98, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That an Act approved March 26, 1908 (Thirty-fifth Statutes at Large, page 48), entitled "An Act to provide for the repayment of certain commissions, excess payments, and purchase moneys paid under the public land laws," be amended to read as follows:

"SEC. 1. That where purchase moneys and commissions paid under any public land law have been or shall hereafter be covered into the Treasury of the United States under any application to make any filing, location, selection, entry, or proof, such purchase moneys and commissions shall be repaid to the person who made such application, entry, or proof, or to his legal representatives, in all cases where such application, entry, or proof has been or shall hereafter be rejected, and neither such applicant nor his legal representatives shall have been guilty of any fraud or attempted fraud in connection with such application: *Provided*, That such person or his legal representatives shall file a request for the repayment of such purchase moneys and commissions within two years from the rejection of such application, entry, or proof, or within two years from the passage of this Act as to such applications, proofs, or entries, as have been heretofore rejected.

"SEC. 2. That in all cases where it shall appear to the satisfaction of the Secretary of the Interior that

any person has heretofore or shall hereafter make any payments to the United States under the public land laws in excess of the amount he was lawfully required to pay under such laws, such excess shall be repaid to such person or to his legal representatives; *Provided*, That such person or his legal representatives shall file a request for the repayment of such excess within two years after the patent has issued for the land embraced in such payment, or within two years from the passage of this Act as to such excess payments as have heretofore been made.

"Sec. 3. That when the Commissioner of the General Land Office shall ascertain the amount of any excess moneys, purchase moneys, or commissions in any case where repayment is authorized by this statute, the Secretary of the Interior shall at once certify such amounts to the Secretary of the Treasury, who is hereby authorized and directed to make repayment of all amounts so certified out of any moneys not otherwise appropriated and issue his warrant in settlement thereof.

"Sec. 4. That the Secretary of the Interior is hereby authorized to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this Act into full force and effect."

#### Sale of Lands on Minidoka Project for Railroad Purposes.

AN ACT To authorize the sale of certain lands at or near Minidoka, Idaho, for railroad purposes. (Act Dec. 17, 1919, Private No. 7, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the Secretary of the Interior be, and he is hereby, authorized to sell and convey to Oregon Short Line Railroad Company, a corporation organized and existing under the laws of the State of Utah and authorized to do business in the State of Idaho, its successors and assigns, for railroad purposes, and at a price to be fixed by the Secretary of the Interior in order to return the expenditure heretofore made or proposed for the irrigation of the lands at not less than \$50 per acre, and under such terms, conditions, and regulations as the Secretary of the Interior may prescribe, the following described land, situated in Minidoka County, Idaho:

All that part of the west half of the southeast quarter and the southeast quarter of the southwest quarter of section two, and the northwest quarter of the northeast quarter and the north half of the northwest quarter of section eleven, all in township eight south, range twenty-five east of the Boise meridian, within the following described area:

Beginning at the intersection of the present southeasterly right of way boundary of the Twin Falls Branch of the Oregon Short Line Railroad Company with the section line common to said sections two and eleven, one hundred feet southeasterly from and at right angles to the center line of main track of said railroad, said intersection also bearing north eighty-nine degrees five minutes west, four hundred and sixty and one-tenth feet from the quarter section corner common to said sections two and eleven; thence north forty degrees twenty-five minutes east along said southeasterly right of way boundary, being one hundred feet southeasterly from and parallel to said center line of main track, for a distance of seventeen hundred and twenty-six and eight-tenths feet; thence south naught degrees one minute east, and parallel to

the north and south center line of said section two, for a distance of thirteen hundred and thirty-two and six-tenths feet, to a point in the section line common to said sections two and eleven; thence continuing south naught degrees one minute east, and parallel to the north and south center line of said section eleven, for a distance of thirteen hundred and twenty feet, to the south line of the northwest quarter of the northeast quarter and the north half of the northwest quarter of said section eleven; thence north eighty-nine degrees five minutes west, along said south line, for a distance of twenty-two hundred and twenty-nine and five-tenths feet, to a point in the present southeasterly right of way boundary of said railroad; thence north forty degrees twenty-five minutes east, along said right of way boundary, and being one hundred feet southeasterly from and parallel to said center line of main track, for a distance of seventeen hundred and ten and four-tenths feet, to the point of beginning, and containing in all sixty-seven and eighty-seven one-hundredths acres, more or less, within the proposed pumping unit of the Minidoka project of the United States Reclamation Service.

#### Patent to John Albert Thompson for Lands in North Dakota.

AN ACT To authorize the issuance of patent to John Albert Thompson, and for other purposes. (Act Dec. 30, 1919, Private No. 16, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the Secretary of the Interior be, and he is hereby, authorized and directed to issue patent for the west half of the northeast quarter of section twenty-three, township one hundred and fifty-eight north, range ninety west of the fifth principal meridian, North Dakota, to John Albert Thompson, pursuant to his homestead entry naught two thousand and twenty-two, Minot series.

Sec. 2. That the Secretary of the Treasury be, and he is hereby, directed to set aside and appropriate, in accordance with the provisions of section 1 of the act of June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for reclamation of arid lands," the sum of \$120, which was paid by said Thompson as purchase price of the described land.

#### Congressional Bills of Interest to Our Readers.

##### IN THE SENATE.

*S. Res. 244*: A resolution requesting the Secretary of the Interior to furnish information relative to leases concerning lands upon the Uintah Indian Reservation in Utah, introduced December 3, 1919, by Senator William H. King, of Utah.

*S. 3486*: "A bill to provide compensation in lieu of taxes to the several States with respect to certain public lands within their borders," introduced December 4, 1919, by Senator Reed Smoot, of Utah.

*S. 3639*: "A bill making an appropriation for the further reclamation of arid lands, and for other pur-



poses," introduced January 5, 1920, by Senator William H. King, of Utah.

*S. 3641*: "A bill making an appropriation for the construction of drainage facilities in connection with the Newlands reclamation project in the State of Nevada," introduced January 6, 1920, by Senator Charles B. Henderson, of Nevada.

The following bills have passed the House and are now being considered in the Senate:

*H. J. Res. 20*: "Joint resolution giving to discharged soldiers, sailors, and marines a preferred right of homestead entry." Passed the House December 10, 1919.

*H. R. 2946*: "An act to amend acts to permit the use of the right of way through the public lands for tramroads, canals, and reservoirs, and for other purposes." Passed the House December 1, 1919.

*H. R. 8308*: "An act providing for an exchange of lands between Swan Land and Cattle Company and the United States." Passed the House December 19, 1919.

*H. R. 8440*: "An act to restore to the public domain certain lands heretofore reserved for a bird reservation in Siskiyou and Modoc Counties, California, and Klamath County, Oregon, and for other purposes." Passed the House December 10, 1919.

#### IN THE HOUSE.

*H. Res. 405*: A resolution authorizing a special committee to consider all bills and resolutions introduced during the Sixty-sixth Congress pertaining to bonuses, additional compensation, employment, rural homes, and agricultural development in reference to soldiers and sailors, introduced December 3, 1919, by Representative William B. Bankhead, of Alabama.

*H. R. 11017*: "A bill to provide employment for returned soldiers, to open up the unused lands and natural resources of the United States for the use of returned soldiers and other citizens who may desire access to them, and to promote the general welfare of all the people of the United States, and to establish an executive department of the United States to be known as the Department of Land and Natural Resources," introduced December 9, 1919, by Representative George Huddleston, of Texas.

*H. R. 11305*: "A bill authorizing the San Luis Valley irrigation district, Colorado, to purchase certain public lands," introduced December 18, 1919, by Representative Guy U. Hardy, of Colorado.

*H. R. 11391*: "A bill to restore to entry certain lands in Klamath County, Oreg., and for other purposes," introduced December 20, 1919, by Representative N. J. Sinnott, of Oregon.

*H. R. 11553*: "A bill for the relief of the Imperial Valley, California, and for other purposes," introduced January 7, 1920, by Representative William Kettner, of California.

*H. R. 11752*: "A bill to control and conserve for irrigation, power, and other uses the flood and flow waters of the Colorado River of the West; to protect property and construct trunk canals wholly in American territory for irrigation and for other purposes," introduced January 14, 1920, by Representative Charles H. Randall, of California.

#### Admitted to Practice Before Supreme Court.

On January 5, 1920, Mr. Richard J. Coffey and Mr. James E. Golladay, attorneys in the Reclamation Service, were admitted to practice before the bar of the United States Supreme Court.

—Will R. King.

#### EXPERIMENTS MADE WITH ALKALI WATER FOR IRRIGATION.

The Utah Agricultural Experiment Station has just completed a number of very important experiments in a series which it is running on alkali. The purpose of these experiments was to secure information on the extent to which alkali waters might successfully be used for irrigation. The work was conducted by Dr. F. S. Harris, director and agronomist of the experiment station, and Mr. N. I. Butt, assistant agronomist.

Dr. Harris says that much more land needs irrigation than can be supplied from available sources. For this reason it is important to be able to utilize all the water that is possible, even that which is not entirely pure. This makes it desirable to know just what are the danger limits of alkali in irrigation water. If the tilling of land requires irrigation with water which will render it unproductive, it is highly desirable to prevent the erection of expensive irrigation structures.

The experiments were begun in 1915 and continued for three years. In order to make the work very extensive and to control as many of the influencing factors as possible, the work was conducted in the laboratories and greenhouses of the station. The crops were planted in jars and tumblers and irrigated with water containing the most common alkali salts in various concentrations and mixtures. In a number of cases the same soils were used for all three years to determine not only the effect during the one year but the cumulative effect over a period of years. At harvest time each year various data were taken to determine the effect of the treatment, such as number of leaves per plant, length of leaves, number and length of culms, number of heads and spikelets, and dry weight of crop. The extent of the injury was determined by comparing with plants grown under the same conditions except that pure water was used for irrigation. Tests were also made to determine the concentrations which would kill the plants after definite periods of

time, also the concentration of each salt which would kill the plant with one application.

The bulletin which has just been issued by the station reporting this work entitled, "The Use of Alkali Water for Irrigation," contains many interesting points, including a summary of the work of numerous other investigators of this problem.

The point at which injury was noted by the authors varied from 500 parts per million with sodium carbonate to about 4,000 parts per million of sodium sulphate. In summarizing the work the authors state that on land irrigated with alkali water for only one year, or with but a single irrigation, much stronger concentrations than mentioned above can be endured, but for regular irrigation water any concentration above about 500 parts per million of sodium carbonate, 1,000 parts per million of sodium chloride, 4,000 parts per million of sodium sulphate, and 4,000 parts per million of the mixed salts may be considered as dangerous.

This work in connection with previous determinations of the composition of the irrigation waters of Utah, recently published by the station, should be of much practical value to the agricultural interests of the State.

### INSECTS DECREASE CARRYING CAPACITY OF TIETON CANAL.

R. K. Tiffany, project manager of the Yakima project, Washington, reports trouble caused by the larvæ of certain insects attaching themselves to the walls of the Tieton Canal in such numbers as to increase materially the friction and decrease the carrying capacity of the canal.

The insects are found attached to the inner wall of the concrete-lined canal, where the velocity is 9 to 10 feet per second, the surface quite smooth, as it was cast in metal forms, and the temperature of the water ranging from 45° to 70° F.

An inspection of the canal at spillway No. 1 during August showed no water grass or algæ present,<sup>1</sup> but the sides of the section were thickly infested with small brownish-colored worms, slightly less than one-sixteenth inch thick and varying from three-eighths to one-half inch in length. These worms gained lodgement in the small pores in the concrete, and upon gradually reducing the quantity of water flowing, they followed down the sides to the lower level. When the canal was suddenly shut down they emerged from the pores and crawled over the concrete. Apparently the full colony survived a two-day shutdown about the middle of September, but no traces were to be found two weeks after the water was shut off on September 30.

<sup>1</sup> See Reclamation Record, November, 1918, p. 531, for method of controlling algæ by copper sulphate.

Upon making an examination of this part of the canal two days after the close of the irrigation season, a larger species was found with the others in the pools in the bottom. The larger variety averaged about one-half inch in length and from three thirty-seconds to one-eighth inch in thickness, and were brown and greenish-brown in color.

Small nests or cocoons of these two varieties of insects were removed from the sides of the concrete about the middle of October. The smaller cocoons were scattered thickly over the sides of the section with openings directed downstream; the larger cocoons were less frequent, opened against the current, and were found in the shaded areas and under Steeple tunnel. It required some care to remove the smaller cocoons with a pocketknife. The larger variety were readily dislodged with the fingers.

A description of the insects and samples of the cocoons were submitted by the Washington office to the Bureau of Entomology, United States Department of Agriculture, for suggestions regarding the possible elimination of the insects. Mr. L. O. Howard, chief of the bureau, states that the specimens are "cases of the caddis fly and the cocoons and pupa shells of one of the black flies of the genus *Simulium*," and that he "can suggest no other method of removing these insects than scraping them off with a hoe or some other instrument."

Both Mr. Weymouth, chief of construction, and Mr. Tiffany wrote about the pest to Mr. R. E. Shepherd, manager of the North Side Twin Falls Land & Water Co., who had experienced similar trouble with these insects in 1918. At that time Mr. Shepherd brought the matter to the attention of Mr. Ralph H. Smith, associate entomologist of the University of Idaho, who suggested that "a heavy cotton rope might be soaked in kerosene and hung along the sides of the cement retaining walls so as to just touch the surface of the water. This would keep a film of oil along the moistened surfaces of the walls where the water splashes up, and might possibly prevent the females from laying their eggs. In laying their eggs the female flies light upon the cement wall and move down to where they can dip the posterior end of the abdomen in the water, or at least in the surface film of water on the walls. If a film of kerosene were present the end of the female's abdomen would get a coat of kerosene, and although it would be ever so small an amount, it would be sufficient to kill her. I do not know of the oiled rope ever being tried for such purposes, and so it would be a matter of experiment in many respects to find how long one oiling of a rope would last, etc. It is possible crude oil might do the work just as effectively as kerosene."

Mr. J. G. Needham, limnologist of Cornell University, to whom Mr. Smith also wrote concerning the pest, stated in reply that he could think of "no better means of killing them off than the oiled rope sus-



pended at the surface of the water on each side of the canal." Mr. Needham also suggests that "painting the canal walls at the surface of the water with some asphaltum mixture might serve as a repellent and prevent the deposition of eggs."

These suggestions were not received in time to be put into effect by Mr. Shepherd in 1918, and in the following year the insects were present in such small numbers as to cause no trouble.

It is possible that similar infestations on other projects have been successfully combated by other methods than those suggested by our correspondents, and the matter is called to the attention of the project managers with a view to eliciting information that may be helpful to Mr. Tiffany and others in eradicating this pest. The RECORD will be glad to publish these suggestions.

### SOME SNOW!

Fred S. Dart, of Spanish Fork, Utah, a foreman on the Strawberry Valley project, sends us a photograph, reproduced in the accompanying illustration, showing some of the hardships of reclamation work on that project. Mr. Dart writes as follows:

"The picture was taken on December 17, about 1 mile from the west portal of Strawberry Tunnel. Supt. G. A. Warning and Foreman Fred S. Dart are



COMING OUT

bringing out their camp. The snow is about 4 feet deep on the level there, and in some places there are drifts 10 feet deep. The men had been repairing the tunnel and were closing down for the winter. They are helping to draw the heavy wagon through the snow by means of a 1-inch rope fastened to the tongue. Mr. Warning is at the rear, having just helped to dig the wheels of the wagon out of a drift. The party was met by other teams 6 miles farther down the canyon, and from there on the road was not so difficult."

## WATER USERS AND THE FEDERAL FARM LOAN SERVICE.

By F. L. Cavis, Chief Accountant, United States Reclamation Service.

An interesting suggestion comes from the Minidoka project, Idaho. Some of the water users on the Twin Falls North Side project, in southern Idaho, have found it profitable to borrow money from the Federal Farm Loan Banks to pay up the balance due on their water rights. This project was constructed by private interests under the provisions of the Cary Act, and deferred payments on water-right contracts bear interest at a rate somewhat higher than that at which it is possible to borrow from the Federal Farm Loan Banks.

In this situation is the germ of a new idea for financing future Reclamation projects. Assuming that future developments will call for interest on deferred payments, it is suggested that organizations of water users may be effected through which to borrow at the low rate of interest charged by the Federal banks and pay the water-right charge in full. Even though the rate of interest were the same, this scheme would be of advantage, as it would greatly shorten the period of capital turnover in the reclamation fund and enable the development of the resources of the country more rapidly through the operation of the Reclamation law.

An example of how this would affect the water user is illustrated by the case of a water right for 40 acres at \$60 an acre payable in 20 equal annual installments. In the accompanying table comparison is made with interest rates at 5 and 6 per cent per annum on deferred payments.

	Interest pay- ments, 5 percent.	Interest pay- ments, 6 percent.	Annual pay- ments.	Balance of principal.
Total of contract .....				\$2,400
First payment of one-twentieth .....			\$120	2,280
Payments due end of --				
First year .....	\$114.00	\$136.80	120	2,160
Second year .....	108.00	129.60	120	2,040
Third year .....	102.00	122.40	120	1,920
Fourth year .....	96.00	115.20	120	1,800
Fifth year .....	90.00	108.00	120	1,680
Sixth year .....	84.00	100.80	120	1,560
Seventh year .....	78.00	93.60	120	1,440
Eighth year .....	72.00	86.40	120	1,320
Ninth year .....	66.00	79.20	120	1,200
Tenth year .....	60.00	72.00	120	1,080
Eleventh year .....	54.00	64.80	120	960
Twelfth year .....	48.00	57.60	120	840
Thirteenth year .....	42.00	50.40	120	720
Fourteenth year .....	36.00	43.20	120	600
Fifteenth year .....	30.00	36.00	120	480
Sixteenth year .....	24.00	28.80	120	360
Seventeenth year .....	18.00	21.60	120	240
Eighteenth year .....	12.00	14.40	120	120
Nineteenth year .....	6.00	7.20	120	0
Total, interest and principal ..	1,140.00	1,368.00	2,400	.....

From this it will be seen that on a 20-year contract for \$2,400 even 1 per cent less in the interest rate would mean a saving of \$228 to the water user.

**SALT RIVER PROJECT ENCAMPMENT.**

By Leland S. Parke, State Club Leader, Tucson, Ariz.

The second annual Farm Boys' Encampment held at the State Fair, Phoenix, Ariz., on the Salt River project, was a decided success in every way. The encampment was held jointly with a group of Boy Scouts, and in all there were upward of 75 boys. Boxing matches, football games, and other sports helped to keep the camp spirit at a high pitch.

To the State Fair Association must fall a large part of the credit, for no effort was spared to make the camp a success. Large electric-lighted tents, complete with beds, coupled with meals like mother's own cooking, helped materially to keep the camp spirit at the 100 per cent mark. The boys enjoyed every minute of the camp and regretted very much to close shop.

The consensus of opinion is very neatly summed up in this excerpt from one of the boys' letters: "Encampment was fine; those big tents and electric lights just filled the bill. The 'grub,' and plenty of it, was all right. The captain was a mighty nice fellow and everybody got along fine with him; he kept good order, and we all had a good time."

Cultivate the habit of walking with head up and the shoulders thrown back. It is cheaper and better than bottled tonics.

**HEALTH NOTES FOR OUR SETTLERS.****To Make Young America Fit.**

The United States Public Health Service has started the new year with a campaign to make young America physically strong and mentally bright, more particularly the boys between the ages of 15 and 20 years.

It is estimated that there are 6,000,000 boys within this age group in high schools and colleges, or working for a living in industries or in rural communities.

In the age group just above this, from 21 to 30, the draft revealed that approximately one man in every three was physically unfit for active military duty. There is no way of knowing the exact physical condition of the boys from 15 to 20 years old, but it is not at all unlikely they will develop into manhood in about the same condition as the men between 21 and 30 years old to-day unless a program of health education is undertaken.

The Public Health Service believes that a great many of these physical and mental handicaps can be removed if the boys keep themselves physically fit, clean, and mentally alert, which they can do if they are taught to play and work properly and have their minds and habits directed along wholesome lines. It would, of course, be almost impossible to reach all of these 6,000,000 boys in this first yearly campaign; consequently the goal for the first year has been set at 3,000,000 boys. Efforts will be made to have this number see the "Keeping Fit" exhibit prepared by



FUN FOR THE BOYS.



the Public Health Service and read the carefully prepared pamphlet "Keeping Fit." With this groundwork it will be possible, later, to expand the campaign to reach a larger number of boys, and at the same time enlarge the scope of the educational work.

Thirty-eight of the States already have organized and have the campaign well under way with trained leaders supervising the work. First reports are showing most gratifying results.

One of the most active cooperating agencies is the Young Men's Christian Association, which reaches thousands of boys that can hardly be reached in any other way. The boys themselves are vitally interested in physical fitness and are to be made active crusaders among their boy friends.

The Red Cross, Junior Red Cross, Boy Scouts, Ro-

tary clubs, Sunday-school associations, Federal Council of Churches of Christ in America, United States Bureau of Education, American Federation of Labor, State manufacturers' associations, chambers of commerce, and Kiwanis clubs are actively cooperating in many instances.

A very little of the right kind of training to boys will go a very long way, according to educators. These millions of boys are expected to be materially benefited if they can be taught the value of walking with their heads erect and shoulders back. If in addition they can be taught to take the right kind and right amount of exercise, to eat properly, get plenty of sleep, and not form injurious habits, they should reach manhood mentally and physically superior to the young man of former generations.

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## IRRIGATION ABROAD.

### Notes from Commerce Reports.

#### Irrigation Projects in the Punjab.

The great Sarda - Ganges - Jumna project of the United Provinces, an important feature of which was to make more water available for the insecure tracts of the southeast Punjab, has been definitely abandoned. It had first been hoped that storage of Jumna waters by means of a dam at Koch in the Nahan State would meet the needs of this portion of the Province, but owing to difficulties connected with the foundations for the dam this scheme was also shelved. In the meanwhile it had been discovered that of all the rivers the Sutlej offered the most satisfactory prospects for storage, and this led to the Bhakra dam project, one of the most important irrigation schemes in contemplation. It implies the construction of a dam 395 feet high in the Bhakra gorge, about 40 miles upstream from Rupar, to impound 2,500,000 foot acres, giving an average daily draw-off of 6,075 cubic feet in the months October to April, inclusive. A new weir about 12 miles downstream from the Phillour railway bridge would enable a separate canal—the Lower Sirhind—to feed the lower portions of the Abohar and Bhatinda branches of the existing Sirhind Canal and to carry water into Hissar and Bikanir. The water in the present Sirhind Canal thus set free would supply a feeder channel to the Sirsa branch of the western Jumna canal near Kaithal, and, in addition to taking up the irrigation of the branch below this point, it would permit of extensions into unirrigated country. Similarly the water set free in the Sirsa branch of the western Jumna would be made available for other desirable extensions from that system. The scheme, if practicable, solves the problem of famine in southeastern Punjab.

At the same time, the old Sutlej Valley project, strongly opposed by the Bahawalpur Durbar, has been considerably modified. It is proposed to build two weirs, each supplying a large canal on either bank—an upper weir at Gandasing walla and a lower near the Jamlera station of the Sutlej Valley Railway. The area watered by the four canals will be about 3,000,000 acres, of which one-tenth lies in Bikanir and the remainder in British territory and Bahawalpur in approximately equal parts. It is understood that in this form the project removes all the former objections of the Bahawalpur Durbar. A small scheme, which has been under consideration for some years past, is the Wular Lake barrage in Kashmir. It provides for the storage of Jhelum water during the monsoon for use in Punjab canals during the winter months.

A fourth project is that known as the Haveli, which aims at improving the semipermanent canals of the Sidhnai series, and at extending irrigation into a large uncommanded tract in the Jhang district. It has been proposed to extend the Lower Bari Doab Canal to supply the Sidhnai channels, now fed by the uncertain discharges of the Ravi River. To this the Haveli scheme is an alternative. A weir at Haveli Bahadur Shah, a village on the Chenab River downstream from the confluence of the Jhelum and the Chenab, would benefit the Multan inundation canals as well as the Sidhnai and bring new areas under command.

The fifth new Punjab project is a revival of the old idea of a weir across the Indus at Kalabagh and a canal to irrigate annually some 2,000,000 acres of the Sind Sagar Doab between the Jhelum and the Indus.

In the aggregate, the five schemes mean the con-

struction of a dam higher than any dam now in existence, a lake barrage, five weirs across formidable rivers, and nine new main canals in addition to all

the subsidiary channels. The total expenditure on them would amount to about \$110,000,000, with an annually irrigated area of possibly 6,000,000 acres.

### COOPERATION AND MARKETING.

We have received recently, through the courtesy of Mr. Jewell Mayes, secretary of the State board of agriculture, Jefferson City, Mo., a pamphlet with the above title, which is well worth careful study and thought.

"Cooperation," says Mr. Mayes, "is to-day the most important word in the social and financial development of both the agricultural and industrial affairs of community, State, and Nation.

Included in the bulletin are the texts of Missouri's new cooperative law approved May 24, 1919, providing for and authorizing the incorporation of agricultural or mercantile cooperative associations for the purpose of conducting any agricultural or mercantile business on the cooperative plan, and the new marketing bureau law, approved August 7, 1919, to establish a State bureau of marketing to assist producer and consumer in the problems of marketing and distribution of farm products, and for cooperation relating thereto.

Lack of space prevents us from reprinting the texts of these two laws, but doubtless copies may readily be secured by writing to Mr. Mayes.

The following suggestive compilation, taken from the bulletin, shows, for each of the irrigation States, as of March, 1919, the situation with respect to State marketing bureaus:

*Arizona.*—There is no official State marketing department. (By "official State marketing department" is meant an organization created by legislative act and specifically charged with carrying out regulatory or investigational work in the marketing of farm products.)

*California.*—Official marketing work was begun in November, 1915. The State market director has authority to collect and disseminate information, to issue labels bearing the seal of the State market commission, and to promote the organization of cooperative associations. Particular attention has been given to plans for financing and otherwise aiding the growers and their organizations in the marketing of dried fruit and citrus crops.

*Colorado.*—No official marketing department.

*Idaho.*—The State department of farm markets, with headquarters at the statehouse, Boise, is the official marketing organization. The director is responsible to the governor and the legislature. Work was begun in 1916. The department is independent and divorced from every other department or institution in the State. The main objects of the work carried on are: (a) To promote the economical and effi-

cient production and distribution of all farm products and to aid in whatever way may be consistent or necessary in accomplishing the reduction of waste in marketing; (b) to maintain a market news service and act as a clearing house between producer and consumer; (c) to protect homeseekers from unscrupulous promoters; (d) to act as a free employment bureau for farm help; (e) to act as a sales agent for farm property upon the payment of a nominal fee and a commission of 1 per cent; (f) to establish and promulgate standards for receptacles for farm products, and standards for the grade and other classification of farm products; (g) to appoint and license State inspectors of agricultural products.

*Montana.*—No official marketing department.

*Nebraska.*—No official marketing department.

*Nevada.*—No official marketing department.

*New Mexico.*—No official marketing department.

*North Dakota.*—No official marketing department.

*Oregon.*—The official State marketing agency is the bureau of organization of markets, with headquarters at Corvallis. The director is a joint employee of the Bureau of Markets, United States Department of Agriculture, and of the extension service of the Oregon Agricultural College. The bureau was established on October 9, 1914. General investigations relative to the marketing of agricultural products in Oregon are made. The bureau cooperates officially with the Oregon State Grange, the Farmers' Educational and Cooperative Union, the State corporation commissioner's office, and the State banking commissioner's office.

*South Dakota.*—Marketing work was begun under authorization of chapter 255, Laws of 1917. The director has authority to investigate the subject of marketing farm products, to gather and disseminate information on this subject, to promulgate grades and standards, and to prescribe and promulgate rules and regulations for marks, brands, and labels.

*Texas.*—Marketing work is conducted under authority contained in the warehouse and marketing law.

*Utah.*—No official marketing department.

*Washington.*—The office of farm marketing was created by chapter 119, Laws of 1917. The director is also employed as field agent in marketing by the United States Bureau of Markets. The director has authority to investigate marketing conditions and collect and disseminate information. He also assists in the formation of cooperative organizations. The law appropriates \$15,000 for the work.

*Wyoming.*—No official marketing department.



## MONTHLY PROGRESS REPORTS FOR DECEMBER.

Monthly conditions of principal Reclamation Service reservoirs for December, 1919.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.	Roosevelt <sup>3</sup>	1,305,000	2128	1903	712,406	1,034,960	1,034,960	21,658	2082.98	2106.89	2106.89
California, Orland.	East Park	51,000	1199.68	1111.68	325	3,150	3,150		1132.79	1150.53	1150.53
Idaho:											
Boise	Arrowrock	280,000	3211	3018	22,545	36,813	36,813	32,908	3060.9	3082.3	3082.3
	Deer Flat	177,000	2518	2488.6	40,803	49,705	51,497	0	2499.3	2501.2	2501.5
	Lake Walcott	53,500	4245	4240	39,970	40,990	42,110		4243.68	4243.77	4243.87
	Minidoka	846,000	6769	6730	50,420	79,580	79,580		6732.9	6734.53	6734.53
Montana:											
Milk River	Nelson	27,000	2212	2200	24,000	22,600	24,000		2211	2210.5	2211
St. Mary Storage	Sherburne	33,000	4765	4720							
Sun River	Willow Creek	16,700	4130	1085	1,103	1,417	1,417		4100.1	4101.8	4101.8
Nebraska-Wyoming, North Platte.	Pathfinder	1,070,000	5852	5670	199,180	222,110	222,110	922	5783.16	5786.82	5786.82
	Lake Alice	11,400	4182	4159	8,291	7,313	8,291	0	4177.8	4176.2	4177.8
	Lake Minatare	67,000	4125	4074	62,000	58,204	62,000	0	4124.4	4123.8	4124.4
Nevada, Newland	Lake Tahoe	120,000 <sup>4</sup>	6230	6224	0	0	0	0	6225.1	6225.31	6225.46
	Lahontan	290,000	4162	4060	140,400	157,280	157,280	1,270	4144	4147.1	4147.1
New Mexico:											
Carlsbad	McMillan	51,000	3267.7	3241.6	34,850	43,750	43,750	15,700	3265.8		
Rio Grande	Elephant Butte	2,638,800	4407	4231.5	999,273	1,041,303	1,041,723	3,769	4352.5	4354.2	4354.22
Oregon, Umatilla	Cold Springs	50,000	621.5	560	7,759	14,700	14,700	0	581.43	591.25	591.25
Oregon-California, Klamath	Clear Lake	462,000	4540	4514	307,700	307,700	307,700	564	4533.9	4533.9	4533.9
South Dakota, Belle Fourche	Belle Fourche	203,000	2975	2920	90,250	100,360	100,360	0	2958	2959.8	2959.8
Utah, Strawberry Valley	Strawberry	250,000	7558	7517	163,000	166,000	220,000		7540.1	7546.5	7558
Washington:											
Okanogan	Conconully	13,000	2287	2232	790	1,128	1,128	0	2247	2250	2250
Yakima	Bumping Lake	34,000	3426	3389	11,465	16,910	16,910		3405.3	3413.3	3413.3
	Lake Clealum	22,800	2134	2122	26,130	26,915	28,735	1,820	2134.9	2135.2	2135.7
	Lake Kachess	210,000	2258	2192	121,035	125,250	125,250		2133.4	2134.5	2134.5
	Lake Keechelus	152,000	2515	2425	27,795	46,130	46,130		2446.6	2460.1	2460.1
Wyoming, Shoshone	Shoshone	456,000	5360	5132.3	338,845	324,449	338,845	36,131	5340.5	5337.8	5340.5

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> U. S. storage begins at elevation 6229.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—Owing to the great amount of rainfall during the late part of November and the first part of December practically no water was delivered during December. The annual canal cleaning was begun on the Arizona, Grand, Eastern, Consolidated, Western, and Mesa Canals.

Six maintenance crews were in the field during the month and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 280; average head of stock, 118; miles main canal cleaned, 60½; miles laterals cleaned, 57; number of new structures installed, 2; number of old structures repaired, 113; riprap placed, 1,486 feet; dirt fill placed (approx.), 6,000 cubic yards; concrete placed, 9 cubic yards; dry masonry placed, 24 cubic yards.

Drag-line excavator No. 1 widened Eastern Canal from station No. 219 to 239, a distance of 2,000 feet, and moved approximately 5,926 cubic yards of dirt.

The Ruth excavator removed berm from the Consolidated Canal from lateral 12 to 13½, 1¼ miles, and 4 miles on the Eastern, a total of 5½ miles, moving approximately 5,060 cubic yards.

In addition to maintenance work considerable preliminary work preparatory to repairing Granite Reef Dam was carried on.

*Operation of power system.*—Output of the power system during December was 5,040,500 kilowatt-hours.

The Roosevelt power plant operated continuously during the month. Unit No. 4 was completely overhauled, many repairs being made. The Cross Cut plant also operated continuously during the month; South Consolidated plant operated 55 per cent, and the Arizona Falls 46 per cent of the month, operation being suspended while water was out of the canals. Chandler plant was not operated during the month owing to work in progress on the forebay.

All pumping plants were available for use as needed.

Two units at the Highline pumping plant were overhauled and work of overhauling transformers at the Phoenix substation was begun.

*Construction work, Roosevelt.*—Installation of the pipe in the north tunnel was completed on December 24. Pouring of concrete started December 25, and was 60 per cent completed at the end of the month.

*Chandler power plant.*—The reconstruction of the forebay was about 90 per cent completed, pouring of concrete being finished.

*Peoria power system.*—Power lines for town of Peoria were about 90 per cent completed. Power was furnished at points where wiring was complete.

*Mesa switching station.*—Installation of transformers and switchboards practically completed. Transformers were connected to the system and

paralleled with the existing 11,000-volt transformers at Chandler substation and the Cross Cut power plant.

*Office.*—The following acreages were entitled to irrigation service on the first of January, 1920:

	Acreage.	Number of applications.
Permanent.....	126,064.75	3,009
Normal flow.....	899.50	215
Temporary.....	7,256.50	167
Town sites.....	3,973.75	6
	138,194.50	3,397

—W. R. Elliott.

#### YUMA PROJECT, ARIZONA-CALIFORNIA.

The weather conditions during December were excellent, and labor was sufficient for work on hand.

*Construction.*—On the Yuma Valley main drain the Bucyrus drag-line excavator moved 12,000 cubic yards of material, station 843 to station 857.

One thousand five hundred and fifty-two cubic yards of rock revetment were placed on the Yuma Valley levee at the 21-mile post.

Men and equipment were transferred to the use of the War Department in placing about 10,000 cubic yards of rock revetment on the Yuma City levee.

*Operation and maintenance.*—Approximately 2,100 acre-feet of water were delivered to about 4,000 acres on the project. In the Yuma Valley, the Monighan drag line No. 2 moved 4,000 cubic yards of silt from the Pesch Canal. Seventeen miles of laterals were cleaned by the V machine. In the Yuma Indian

Reservation canal cleaning was carried on by teams and by hand. Practically all the cotton on the project has been picked and the gin reports show about 18,000 bales ginned. Some farmers are already making preparations for the coming year's crop.

The Mesa land sale was held December 10 to 13 at Sunset Park, Yuma; 438 units, consisting of 4,932 acres of irrigable land, or about 80 per cent of the unit, were sold. The average price bid was approximately \$30 per acre with maximum of \$155 per acre for a 10-acre tract. The attendance on December 10 was about 400 and on the last day of sale about 50.

The maximum discharge of the Colorado River for the month was 46,100 second-feet, minimum 5,600 second-feet, mean 15,360 second-feet. The discharge on December 31 was 6,600 second-feet with gage height of 15.30. The acre-feet discharge during the month was 944,411. The acre-feet discharge for the year was 10,271,817.

Examiner of Accounts C. E. Piatt left the project on the 18th, after having completed his work in connection with the recent Yuma Mesa sale. Senator Wright and wife, of San Diego, arrived on the 25th and were shown over the various features. Prof. D. W. Working, of the University of Arizona, called on the project manager on the 20th.—W. W. Schlecht.

#### ORLAND PROJECT, CALIFORNIA.

December weather was unusually cold and there was a marked lack of rainfall. The weather was showery and unfavorable for outside work, but the precipitation for the month was only 2.12 inches, 1½ inches below the average. The seasonal rainfall is 3.07 inches, which is about 4 inches below normal. Seven and one-half miles of laterals were cleaned and repaired during the month. A force of 40 laborers and 14 head of

#### Crop report, Orland project, California, year of 1919.

Crop.	Area (acres).	Unit of yield	Yields			Values	
			Total.	Average per acre	Per unit of yield	Total.	Per acre.
Alfalfa hay.....	5,470	Ton.....	27,813	5.08	\$15.00	\$417,195	\$76.27
Other hay.....	737	do.....	886	1.2	18.00	15,948	21.64
Pasture.....	3,655					69,445	19.00
Corn, sorghum.....	2,853	Bushel.....	94,149	33	2.00	188,298	66.00
Wheat.....	283	do.....	4,160	14.7	2.20	9,152	32.34
Barley.....	1,435	do.....	30,994	21.6	1.80	55,789	38.88
Almonds.....	303	Pound.....	151,500	500	.30	45,450	150.00
Citrus fruits.....	150	Box <sup>1</sup> .....	4,700	31	3.50	16,450	109.67
Deciduous fruits.....	169	Pound.....	351,520	2,080	.05	17,576	104.00
Small fruits.....	30	do.....	30,000	1,000	.15	4,500	150.00
Prunes, dried.....	35	do.....	76,000		.10	7,600	138.18
Garden.....	282					30,456	108.00
Nursery.....	10					7,000	700.00
Miscellaneous.....	148					7,400	50.00
Less duplicated areas.....	3,171						
Total cropped acreage.....	12,409	Total and average.....				892,259	71.90

Areas		Acres.	Farms.	Per cent of project	
Irrigated, no crop:					
Nonbearing orchard.....	2,123	Irrigable area farms reported.....	16,600	600	79.8
Young alfalfa.....	772	Irrigated area farms reported.....	15,203	600	75.4
Not cropped.....	221	Under water-right application.....	15,063	598	74.6
Less duplicated areas.....	322	Under rental contracts.....	80		
		Under vested rights.....	160	2	
Total irrigated.....	15,203	Cropped area farms reported.....	12,409	600	61.5

<sup>1</sup> Box of oranges weighs 60 pounds.



stock, working 16 days, placed 9,000 square yards (475 cubic yards) of concrete lining. At East Park Reservoir 2,815 acre-feet of water accumulated, 1,868 of which was run through the feed canal. A great deal of farm development work was underway and a number of new settlers arrived with their household goods. The last of the season's orange crop was shipped out prior to the 25th. The prices for farm products remained about the same as for the previous month, with the exception of butter fat, which advanced to 80½ cents per pound.—*A. N. Burch.*

#### GRAND VALLEY PROJECT, COLORADO.

December was the coldest month in the 28 years during which weather records have been maintained in the Grand Valley, with a minimum of  $-20^{\circ}$  and a mean temperature for the month of  $16^{\circ}$ . Ample labor was available for all work in progress.

The delivery of all sugar beets was completed during the month. On account of the unfavorable weather, practically no other farm work was undertaken except the feeding of stock. Project farmers found a ready market for their beet tops and other surplus forage with the owners of cattle and sheep.

Maintenance forces were reduced to a minimum and the only work performed was the overhauling of the machinery in the Price-Stub plant, repairs on structures, and the manufacture of weirs and turnouts at the camps.

Work on the construction of the drains in the Grand Valley drainage district was continued throughout the month with two drag-line excavators. The heavy blanket of snow prevented the ground from freezing and the excavation of the drains was carried on with little difficulty. Six thousand linear feet of drain were completed, involving 5,000 cubic yards of excavation. The work on the drainage of the Indian school lands for the State of Colorado was successfully completed at the end of the month.—*S. O. Harper.*

#### UNCOMPAHGRE PROJECT, COLORADO.

December was unsatisfactory for all kinds of work, due to the amount of snow on the ground and the general cold.

Several cars of potatoes, cattle, and hogs were shipped from the project. All live stock had to be fed during the month, as little benefit was derived from the pastures.

A small amount of water was carried in the High-line and Loutsenhizer Canals for domestic and stock use.

The work of repairing the Montrose and Delta slides was completed. The diversion channel above the Loutsenhizer headworks was constructed, and a portion of the work of placing the timber bulkhead in the incline at River Portal was completed. Considerable work was done on the Ironstone slide and at the Ironstone headworks.

The principal construction work consisted of the completion of the culvert under the Loutsenhizer Canal at Dry Cedar Creek and the construction of a drop and headgate above the culvert.—*Fred D. Pyle.*

#### BOISE PROJECT, IDAHO.

December weather conditions were unusually severe. On the 13th the temperature was  $7^{\circ}$  below zero. This is the lowest December temperature since 1884. It is the most severe temperature recorded since January 4, 1910.

A snowstorm of the 4th and 5th covered the ground to a depth of 11 inches in the valley. The greater part of this, however, disappeared before the end of the month. Precipitation for December was 0.52 inch below normal.

*Labor conditions.*—Due to winter weather conditions there was a general suspension of work, which threw a number of men out of employment. There was no change in the scale of wages. As soon as weather conditions permit all labor will probably find employment.

*Farming operations.*—The farmers were occupied with feeding and care of live stock. Considerable hay was baled and shipped during the month.

*Water supply.*—The precipitation during the month was below normal; the snowfall on the high drainage area was light. Heavy snow in the mountains during October and November brought the total for the last three months of the year slightly above normal. The average daily flow of Boise River for December was 857 second-feet, being about the mean of the four previous low years.

*Operation and maintenance.*—A head of about 500 second-feet was carried through the Main Canal to supply Deer Flat Reservoir until the 9th, when it was turned out on account of ice jams in the lower section.

A small amount of repair work was done on minor structures. Cold weather prevented general work.

*Construction.*—Work was suspended on the Notus Canal the first of the month on account of freezing weather. During the latter part of the month, when the weather moderated, work was resumed with a small crew on rock excavation on the suspended contract of William Long, covering stations 204 to 238, Notus Canal.

*Drainage.*—Electric drag line No. 3 worked during the entire month on the South Alkali drain under the Riverside district. Drag line No. 4, on work in the same district, was excavating on the Riverside drain. Ten days were lost by this machine on account of frost conditions. When in operation, two shifts were employed on each machine. The material moved by each machine amounted to 36,505 cubic yards for No. 3 and 18,400 cubic yards for No. 4.

*Surveys.*—Field surveys made during the month were in connection with the drainage work in progress. Work of obtaining irrigable areas in the unit of the Black Canyon irrigation district were in progress in the Boise office.

*Visitors.*—Mr. R. K. Tiffany, project manager of the Yakima project, visited the project office on the 15th.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

The weather during December was very unfavorable for construction work. Below freezing temperature was recorded every day during the month. Snow fell on the 10th and 14th, remaining on the northern slopes throughout the remainder of the month. Labor was plentiful, making it unnecessary to ship men from outside districts.

At Camp 4 the 1-mile flume without contraction joints was completed on the 24th. Wasteway No. 9 was completed and forms and steel had been placed and floor had been poured for wasteway No. 2 at the end of the month; 15 per cent of the excavation for combination concrete lining and flume section at station 230 had been completed at the end of the month.

At Camp 5 the floor of the combination concrete and gunite flume was 82 per cent complete and the gunite side walls 22 per cent complete on December 11, when work was stopped by reason of the extreme cold weather. Excavation for sills and the final preparation of subgrade of the semiprecast flume was prosecuted until December 19, when it was discontinued on account of frozen ground. Work on Deer Gulch siphon was carried on throughout the month and at the end of the month the intake structure, the thrust block for the steel elbow, and all piers completed east of the thrust block. Excavation for spillway No. 8 was completed and the erection of forms and placing of steel was in progress at the end of the month.

One engineering field party was employed at each camp in connection with construction operations.

The office engineering and clerical forces were employed during the month on routine work.

Owing to the severe weather no operation and maintenance work was performed by the King Hill irrigation district.

District Counsel B. E. Stoutemyer and Designing Engineer J. L. Savage visited the project during the month.—*Walter Ward.*

#### Prevailing crop prices at close of December, 1919.

Project.	Alfalfa hay, per ton.		Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at shipping point.				
Salt River.....	\$20-\$24	\$26-\$30	\$1.50	\$1-\$1.08	12.00	
Yuma.....	18.00	25.00				
Orland.....	25.00	28.00	1.90		2.50	
Grand Valley.....	20.00	25.00	1.40	.88	1.93	\$1.00
Uncompagre Valley.....	14.00		1.50	.90	2.00	1.85
Boise.....	20.00	26.00	1.44	1.15	1.85	1.75
King Hill.....	20.00	24.00		1.10		2.10
Minidoka.....	21.00	25.00	1.44	.94	2.04	2.10
Huntley.....		25-29			2.45	
Milk River.....	25.00	30.00	1.18	.77	2.70	2.70
Sun River.....	28.00	34.00	1.30	.90	2.77	2.10
Lower Yellowstone.....	25.00		1.22	.86	3.14	.00
North Platte.....	16.00		1.30	.90	2.00	1.35
Newlands.....	18.00	25.00				1.75
Carlsbad.....		30.00				
Rio Grande.....						
North Dakota pumping.....						
Umatilla.....		29.50				
Klamath.....	15.00	20.00	1.40	.93		
Belle Fourche.....	30.00			1.00	2.70	1.60
Strawberry Valley.....	30.00	35.00	1.88	1.20	2.60	1.80
Okanogan.....	25.00					2.50
Yakima:						
Sunnyside unit.....		28.00				2.50
Tieton unit.....		28.00				
Shoshone.....	19.20	24.30		.90	2.50	1.50
Indian projects:						
Blackfoot.....	32.00		1.19	.76		
Flathead.....					2.70	
Fort Peck.....	30.00	35.00		.80	.89	1.10
Riverton.....						

#### MINIDOKA PROJECT, IDAHO.

The discharge at Howell's Ferry in December amounted to 280,760 acre-feet, as compared with 284,265 acre-feet for November. At Jackson Lake the gates remained closed throughout the month and the water surface rose from 6,732.9 on November 30 to 6,734.37 on December 27, corresponding to a storage of 37,110 acre-feet during the month and 76,690 acre-feet to date.

On the corresponding date last year the storage amounted to 257,300 acre-feet.

Notwithstanding the cold weather, building activity continued in the towns on the project. Foundations have been placed for an addition to the hotel in Burley, and for a garage and an ice plant. A \$40,000 store and office building was completed in Paul.

A meeting of Reclamation Service officials was held in Burley on the 29th to draft contracts for the proposed American Falls Reservoir construction. It is planned to hold a meeting in the near future with the directors of the various organizations desiring storage, for the purpose of explaining the terms of the contract.

On the Minidoka North Side pumping unit a small force was employed throughout the month checking up the data obtained during the summer and making it a matter of permanent record. Two and one-half miles of new bench levels were run and 15½ miles of levels previously run were rechecked, making a total of 476 miles of original bench levels run to date. On the South Side pumping unit one crew of two men was employed for the first six days of the month on minor repairs, after which they were laid off due to weather conditions. The compiling of field data for the crop census was completed.

The following men visited the project during the month: E. B. Darlington, chief engineer for the Twin Falls North Side Land & Water Co., and R. E. Shepherd, manager; G. Clyde Baldwin, deputy State commissioner of reclamation; J. H. Barker, president, and J. C. Wheelon, manager, of the Twin Falls Canal Co.; Dana Templin, manager, and N. K. Jensen, director, of the Minidoka irrigation district; S. D. Parke, secretary of the Burley irrigation district; Chief of Construction F. E. Weymouth and District Counsel B. E. Stoutemyer.—*Barry Dibble.*

#### Project weather during December, 1919.

Project.	Station.	Temperature, °F.			Precipitation, inch-est.
		Max. min.	Mean.		
Salt River.....	Phoenix, Ariz.....	32	54.2		6.2
Yuma.....	Yuma, Ariz.....	35	56.8		
Orland.....	Orland, Calif.....	25	43.3		2.12
Grand Valley.....	Grand Junction, Colo.....	-20	15.6		.75
Uncompagre Valley.....	Montrose, Colo.....	9	23		.26
Boise.....	Boise, Idaho.....	-7	23.6		1.20
King Hill.....	Glenns Ferry, Idaho.....	-18	22		.39
Minidoka.....	Burley, Idaho.....	-14	5.5		.64
Huntley.....	Billings, Mont.....	-41	16.6		.52
Milk River.....	Malta, Mont.....	-30	11.3		.09
St. Mary storage.....	Near Babb, Mont.....	42	19.7		.71
Sun River.....	Fort Shaw, Mont.....	-39			.83
Lower Yellowstone.....	Savage, Mont.....		1.2		.20
North Platte.....	Wynona, Wyo.....	-38	25.5		T
Newlands.....	Fallon, Nev.....	63	4		.74
Carlsbad.....	Carlsbad, N. Mex.....	17			.18
Rio Grande.....	El Paso, Tex.....	26	47.2		.12
North Dakota pumping.....	Williston, N. Dak.....		1.1		
Umatilla.....	Hermiston, Oreg.....	47	18		1.45
Klamath.....	Klamath Falls, Oreg.....	16	26		2.21
Belle Fourche.....	Orman, S. Dak.....		20.1		.24
Strawberry Valley.....	Provo, Utah.....		25.2		.92
Okanogan.....	Omak, Wash.....	14	20.6		1.76
Yakima:					
Sunnyside unit.....	Sunnyside, Wash.....				.84
Tieton unit.....	Cowiche, Wash.....	17	22.1		1.59
Shoshone.....	Powell, Wyo.....	10	10.3		.27
Indian projects:					
Blackfoot.....	Browning, Mont.....	47	17		.13
Flathead.....	St. Ignatius, Mont.....	75	16		1.14
Fort Peck.....	Poplar, Mont.....	31	9.9		.02
Riverton.....	Pavilion, Wyo.....	42			



## HUNTLEY PROJECT, MONTANA.

The first 14 days of December were cold, and the 9th, with a minimum temperature of  $-41^{\circ}$  F., was the coldest day recorded in 12 years, or since weather observations have been kept on the project. The last half of the month was mild and agreeable.

The Lidgerwood drag-line excavator was sold to Donahue & Co., Chicago, and was dismantled and hauled to Guernsey Siding for shipment.

A number of baling outfits were busy, when weather conditions were favorable, baling alfalfa hay.

Work, other than dismantling the drag line, was confined to the office, principally on the preparation of the annual project history and operation and maintenance report, and routine clerical work.—*R. H. Fifield.*

## MILK RIVER PROJECT, MONTANA.

Weather for the first half of December was unusually severe, but the second half was fine and mild. About 25,000 head of sheep and 3,800 head of cattle are being fed on the project this winter.

Construction work was confined to the repairs and improvements at Dodson South Canal headworks.

At the request of interested landowners several meetings were held on various parts of the project to give information in regard to irrigation districts and their formation and active steps are now being taken

by the landowners to form two districts on the Chinook division and one on the Glasgow division.

Official visitors included District Counsel W. E. Burr and Willis J. Egleston.—*Geo. E. Stratton.*

## ST. MARY STORAGE UNIT.

Severe weather prevailed during the first half of December. The temperatures were low and there were frequent snowstorms and high winds. The last half of the month was mild and pleasant except for high winds.

No construction work was done. The contract freighter completed hauling lumber for Spider Coulee flume and started to haul the steel. The field work done consisted principally of repairing telephone line, baling and hauling hay for next year's use, repairing camp buildings and corrals where stock is being wintered, and similar work. The field force was reduced to six men.—*R. M. Snell.*

## SUN RIVER PROJECT, MONTANA.

The first half of December was colder than that recorded for this month for a number of years past. Low temperatures prevailed, accompanied by snow and wind storms. The latter half, however, was mild, practically all of the snow having disappeared at the end of the month.

No construction work was done during the month. Farmers on the Fort Shaw division were engaged in marketing hay and caring for stock. Practically

## Crop report, Huntley Project, Montana, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	7,045	Ton.....	18,713	2.65	\$19.66	\$367,898	\$52.22
Alfalfa seed.....	146	Bushel.....	283	1.94	13.00	3,679	25.20
Apples.....	12	Box.....	302	25.16	1.50	453	37.75
Barley.....	267	Bushel.....	5,354	20.05	1.68	8,995	33.69
Beets, sugar.....	1,136	Ton.....	12,015	10.58	10.00	120,150	105.77
Beets, sugar <sup>1</sup> .....	94						
Clover hay.....	56	Ton.....	123	2.20	13.88	1,707	30.50
Clover seed.....	188	Bushel.....	839	4.46	10.62	8,910	47.39
Corn.....	179	do.....	5,046	28.19	1.53	7,720	43.11
Garden.....	176					20,080	114.09
Oats <sup>2</sup> .....	1,977	Bushel.....	58,707	29.69	1.16	68,000	34.40
Pasture, summer.....	1,389					16,580	11.94
Pasture, winter <sup>3</sup> .....	16,733					65,834	3.94
Potatoes.....	40	Bushel.....	4,781	119.70	1.77	8,462	211.55
Wheat <sup>2</sup> .....	6,518	do.....	103,149	15.82	2.37	244,463	37.51
Miscellaneous.....	138					6,037	43.75
Total.....	36,094						
Less duplicated areas.....	16,784						
Total cropped.....	19,310		Total and average.....			948,968	49.14
			Areas.		Acres.	Farms or con- tracts.	Per cent of proj- ect.
			Irrigable area farms reported.....		25,888	603	78.8
			Irrigated area farms reported.....		19,310	619	58.7
			Under water-right applications.....		18,834	603	57.2
			Under rental contracts.....		476	416	
Total irrigated.....	19,310		Cropped area farms reported.....		19,310	619	58.7

<sup>1</sup> No yield; no value.

<sup>2</sup> Includes 52 acres of oats and 146 acres of wheat without yield.

<sup>3</sup> Beets, alfalfa, wheat, oats, etc.

<sup>4</sup> Number of contracts.

all the hay excepting that retained for feeding purposes has been marketed. Early in the month the farmers on the Greenfields division experienced considerable difficulty in securing hay due to the severe weather conditions and some loss in live stock occurred.

No operation or maintenance work was done during December, the force being engaged on repairing equipment and fences and gathering and tabulating crop data. Twenty-one carloads of hay were shipped from the Fort Shaw division.—*Geo. O. Sanford.*

#### LOWER YELLOWSTONE PROJECT, MONTANA—NORTH DAKOTA.

December, until the 17th of the month, was very cold and unfavorable for maintenance work. The last two weeks were ideal winter weather, and had it not been for the frozen condition of the ground it would have been possible to operate the three excavators during this period. The mean temperature for the month was 4.6° below the average since 1910.

Machine No. 1 excavated the water bank at Indian Coulee, where considerable trouble has been experienced during the past two seasons; 1,093 yards of wet material were excavated and this bank will be replaced in the spring with gravel. Machine No. 2 was operating two shifts, and from the 10th of the month was engaged in removing sand and gravel from the upper side of the canal to the lower bank through the reach north of Savage; 4,000 yards of material were moved over a distance of 800 feet.

Three small crews were engaged, when weather conditions permitted, at cutting brush in the main canal. A total of 6½ miles of this work was completed during the month.

Irrigation district developments during the month were very encouraging. The referendum votes taken to determine the wishes of the settlers relative to the formation of irrigation districts looking to the acceptance of the contract to be entered into between the districts and the Secretary show that only 11 on the entire project were opposed to the plan, 2 of which were in Montana. The date of hearing has been set by the judge of the Montana district for March 4.—*L. H. Mitchell.*

#### NEWLANDS PROJECT, NEVADA.

During the first half of the month cold weather prevailed, but the latter part was moderate and favorable for project work.

On December 1 the project manager and the superintendent of irrigation attended a meeting and presented to the board of directors of the irrigation district the budget of proposed operation and maintenance expenditures for the calendar year 1920 for their consideration.

From December 2 to 4 District Counsel R. M. Patrick was in San Francisco on legal matters.

On December 6 United States Senator Charles B. Henderson, of Nevada, visited Fallon to ascertain project needs. A meeting of project water users was held to meet the Senator and discuss matters with him.

On December 12 the project manager conferred with Mr. Ethelbert Ward, special assistant to the Attorney General, in Reno, Nev., on Lake Tahoe and Truckee River matters.

On December 20 the project manager, accompanied by Mr. Edmund Dietz, president of the board of directors of the irrigation district, visited water users in the upper Carson Valley in the interest of the Western Reclamation Association, which was organized in Salt Lake on November 21 and 22, 1919.

*Construction work and surveys.*—Construction work for the delivery of water under vested water-right contract to the John W. Freeman Co. ranch was continued, with drag-line excavator No. 2 in operation. Several timber structures were installed in connection with this work.

At the new project shops and yards practically the only work done consisted in the erection of a stiff-leg derrick. The project shops were operated throughout the month on tractor and drag-line repair work.

Frozen ground made the use of the tractors for land leveling work impracticable. These machines have been rented by individuals for private work.

Surveys were made as required in connection with the extension of the "S" laterals to the Freeman ranch.

Numerous farm unit and irrigable area surveys were made for the purpose of placing new lands on the farm unit plats.

*Settlement.*—Cold weather and snowfall during the early part of the month made the examination of project lands by prospective settlers difficult, but clear, ideal weather the remainder of the month promoted settlement activities, and numerous land seekers examined or wrote in concerning available lands.

Twelve homestead filings, covering 922 acres, and three private land water-right applications for 175 acres were accepted during December.

Twelve applicants also requested that 958 acres of new lands be placed upon the plats and deposited initial water-right payments to cover the same.

On December 4 a drawing was held in the project office to select the winning applicant for the N. ½ NE. ¼ sec. 35, T. 18 N., R. 29 E., M. D. M., which was opened to entry under public notice of November 10, 1919. Ten applications were considered in this drawing. The unit in question had been leveled and planted to alfalfa by the Service.

*Water supply and use.*—Storage in Lahontan Reservoir increased 16,880 acre-feet during December, the total storage in this reservoir at the end of the month being 157,280 acre-feet.

The surface of Lake Tahoe rose only 0.21 foot during the month, the elevation being 6,225.31 feet on December 31. As the lake elevation had not reached 6,225.5 feet on this date, the storage for the Service in Lake Tahoe will be automatically set at 36,000 acre-feet for the ensuing year in accordance with the terms of the court decree entered into in the case of the United States v. Truckee River General Electric Co.

Outflow from Lake Tahoe fluctuated between 213 and 404 second-feet, being for the maintenance of power rates along the Truckee River. Drafts from Lahontan Reservoir were made through the power penstock for operation of the Lahontan power plant to permit shutting water out of the Truckee Canal in order to repair the break in the canal referred to below.

*Operation and maintenance.*—On December 10 quite a serious break, caused by melting snows and ice, occurred in the Truckee Canal at about station 687±. Some damage to property and lands resulted. The break was repaired by Government forces in three days.

Trees and willows were removed from about 7¼ miles of laterals during the month. Some brush riprap was placed along main canals and at structures.

As the maintenance work scheduled for the year had been practically completed previously, only a small amount of such work was done during December.—*John F. Richardson.*



## NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

The weather was unusually severe during the first 10 days of December, a temperature of  $-38^{\circ}$  being reached on the morning of the 9th. The weather moderated after the 10th and by the 25th practically all the snow that had fallen in November had melted. No snow fell during December. The mean temperature was  $25.2^{\circ}$ , being  $2.7^{\circ}$  below normal.

**Operation.**—None of the canals were operated with the exception of the Fort Laramie Canal, which was operated as far as mile 25.5, to furnish water for the operation of Lingle power plant. Little difficulty was experienced with ice. The canal was kept checked up at all the checks. The ice on the canal was from 7 to 12 inches thick.

**Maintenance.**—No work was done except routine work around camps. A small force of men was at work on the bridges on Wild Horse drain.

A small crew was at work constructing a floating dredge to be used in widening the banks of the Interstate Canal. This dredge is practically completed.

**Crops.**—The crops raised, the estimated amounts on hand, and the local current prices are about as follows:

	Amount raised.	Amount on hand.	Per cent.	Current price.
Alfalfa hay.....	70,110	42,000	60	\$16.00
Barley.....	101,070	50,000	50	2 1.30
Beans.....	750	560	75	2 3.00
Corn.....	157,700	80,000	50	2 1.50
Oats.....	159,820	80,000	50	2 0.90
Potatoes.....	713,260	300,000	40	3 2.25
Rye.....	5,770	1,500	25	2 1.50
Wheat.....	165,540	50,000	30	2 2.00
Sugar beets.....	116,310	0	0	

1 Per ton in stack. 2 Per bushel. 3 Per hundredweight.

A few beets were not harvested. Some potatoes were lost in the field and while shipping.

**Live stock.**—There was little movement of live stock this month. The stock census shows approximately 56,000 sheep, 5,300 cattle, and 200 horses were brought in for wintering or fattening.

**Drainage.**—Work was continued on the timber bridges on the Wild Horse drain.

On the Fort Laramie unit electric drag line No. 2 continued work on the Cherry Creek drain, working two shifts daily. A total of 17,573 cubic yards of material was moved and 0.66 mile of drain completed.

**Construction.**—Storage unit: Work was continued in getting the plant ready and getting supplies for the installation of the new outlets in the North Tunnel at the Pathfinder Dam.

Interstate unit: No construction was done on account of the cold weather.

Fort Laramie unit: Electric drag line No. 1 continued work on the main Springer lateral, operating two shifts daily. During the month 0.28 mile of lateral was excavated and 7,200 cubic yards of class 1 and 3,250 cubic yards of class 2 material were moved. This machine also moved 4,000 cubic yards of earth in the reconstruction of 1,600 feet of the privately owned Springer ditch where destroyed by the location of the Government lateral. Drag lines Nos. 3 and 5 continued work on the South Horse Creek lateral, each operating two shifts daily. During the month 144 miles of lateral were completed and 46,239 cubic yards of class 1 and 4,839 cubic yards of class 2 material

were moved. Drag line No. 3 joined up, at Station 381 with work already done by No. 5, on December 26, and was moved to the Main Canal south of Kiowa Camp to start excavation. No further work was done on Cherry Creek lateral Siphon No. 1, due to weather and road conditions. The bridge abutments at Station 474 and culvert at Station 560 were completed.

Work was started on Main Canal turnouts, mile 41.3 and 41.8, and on minor structures on laterals, mile 40.7 and 41.3.

**Northport district.**—No excavation work was done on account of frost. Work was continued on the Indian Creek camp.

**Summary of electric drag-line operation.**—Following is a summary of the results obtained by the operation of the four electric drag lines on the Fort Laramie unit:

	For month.	To date.
Number of 8-hour shifts.....	154	1,102
Miles of excavation completed.....	2.38	27.37
Total excavation, cubic yards.....	83,101	779,047
Class 2 excavation, cubic yards.....	8,089	63,935
Class 3 excavation, cubic yards.....	0	150
Average cubic yards per shift.....	539	707
Average kilowatt hours per cubic yard.....	0.72	0.495

**Power-house operation.**—The Lingle power house was operated with two shifts a day until December 4 and three shifts the rest of the month on account of supplying lighting service to the city of Torrington under their contract.

	Month.	To date.
Hours operated.....kilowatt-hours.....	737	4,212
Power generated, total.....do.....	159,195	1,015,074
Power wasted at rheostat.....do.....	30,007	391,727
Power lost in transmission.....do.....	36,738	195,810
Power used, total.....do.....	92,450	427,534
Power used, drag line No. 1.....do.....	9,300	107,400
Power used, drag line No. 2.....do.....	20,000	113,700
Power used, drag line No. 3.....do.....	13,700	77,100
Power used, drag line No. 5.....do.....	18,800	89,400
Power used installing drag line.....do.....		1,000
Power used, Kiowa repair shop.....do.....	5,100	12,493
Power used, Kiowa camp lights.....do.....	6,450	7,341
Power sold to Torrington.....do.....	19,100	19,100
Lost in transmission.....per cent.....	28.5	31
Load factor.....do.....	29	32
Average load.....kilowatts.....	216	240
Peak load observed.....do.....	520	550
Water used through plant.....acre feet.....	2,516	16,141
Average flow through plant.....sec.-ft.....	41	44
Transmission lines in operation.....miles.....	1 33 1/2	
Substation in operation.....do.....	2 8	
	3 17	
	4	

1 P. H. T.

2 T. H. T.

3 L. T.

Lighting service was started to Torrington on December 4 and the people seem well pleased with the service.

**Surveys.**—Interstate unit: No survey work has been done.

Fort Laramie unit: The necessary lines and grades were set for the electric drag lines and some miscellaneous survey work done.

Northport district: Office work was continued on the topographic surveys of the district.—*Andrew Weiss.*

## RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

The weather during December was particularly warm for this time of year.

Construction was confined largely to drainage work. Approximately 220,000 cubic yards of material were excavated from drains with seven Government machines and one machine operated under contract. Two machines operated in the El Paso Valley under contract with the El Paso County irrigation district, and five Government machines were operated in the district covered by the Elephant Butte irrigation district. Two of the machines excavating drains in the Elephant Butte district were financed by funds advanced by the district to the United States.

Drainage construction was begun in the Rincon Valley with the moving of a Monighan 1-yard walking type drag line to the Garfield district of the Rincon Valley. This walking type of machine covered 18 miles at a cost of approximately \$56 per mile.

No water for irrigation was utilized during the month, and anticipating the presence of bad weather in January and the beginning of February, previous to the beginning of the regular irrigation season, contracts were let for ditch cleaning and bank raising, together with some brush and weed removal from the canal banks. This work, which involved 35 contracts and an expenditure of approximately \$37,000, was practically completed by the end of the month. Other maintenance work on the project consisted of renewals in gate mechanisms and construction of brush riprap.

The office force of the operation department was engaged in the tabulation of crop returns and water users' census for the annual project history.

A small amount of cotton was still being harvested and the average yield will approximate 1 bale to the acre. Because of the returns produced during the past year for this crop, the area in this crop on the project during the coming year will probably exceed 10,000 acres. The yield and value of the cotton crops on the limited area experimented with during 1919 have attracted a large number of buyers to the project. These prospective settlers have, in a number of cases, come from the Salt River and Yuma projects, where the price of land has risen to double the cost of similar land on the Rio Grande project.

An election held by the El Paso County improvement district early in December resulted favorably for the three propositions submitted, namely, the change of the basis of assessment from an ad valorem basis to a benefit basis; the change in name of the organization from the water improvement district to a conservation district under the Texas State law, and approving contract between the United States and the district for all lateral and drainage work, together with the assumption of liabilities of the water users' association.

During the month Irrigation Superintendent Parry, accompanied by Roland Harwell, county farm bureau manager, visited the Salt River and Yuma projects to investigate cotton-growing methods and general operation and maintenance methods of these two projects.

Officials of the Utah Construction Co., with offices in San Francisco, which company has a contract for the construction of the water supply dam for the city of San Francisco, visited the project for the purpose of purchasing secondhand equipment used during the construction of the Elephant Butte Dam and now stored on the railroad at Engle, N. Mex. Sales of project equipment since the construction of the dam, and particularly during the war period, have amounted to over \$165,000, which reduces the project cost to the water users by that amount.—*L. M. Lawson.*

## NORTH DAKOTA PUMPING PROJECT.

Weather conditions continued bad during December for all kinds of outside work. A short warm spell simply iced the country roads and made conditions worse. The precipitation was 0.25 inch, which was 0.41 inch below normal and brings the total deficiency for the year to 1.65 inches.

Maintenance work was limited to boiler repairs in the power house and special maintenance in the coal mine and on the mine buildings.

The power plant was operated for commercial power contract; 115,387 kilowatt-hours of electrical energy were delivered to the city of Williston. This was an increase of 10,076 kilowatt-hours over last month and 11,287 kilowatt-hours over the same month of last year. In short, it was the largest commercial power output in the life of the contract, but with the cycle of ever-increasing costs the effect of this increase in output is entirely obliterated.

One thousand and fifty-five tons of coal were mined. In accordance with the settlement of the coal strike, miners' wages and tonnage rates were increased 14 per cent.—*Wm. S. Arthur.*

## UMATILLA PROJECT, OREGON.

Several weather records were broken during December. The lowest minimum temperature ever recorded occurred on the 13th, when 37° below zero was reached. On the 12th —34° was recorded, and on the 14th —29°, both being below any former record. The mean maximum for the month was 26°, while the mean maximum for the previous 12 years for this month was 58.6°. The mean was 18°, while the average mean for this month for the previous 12 years was 33.8°. Precipitation for the month was 1.45 inches; the precipitation for this month for the previous 11 years was 0.84 inch. The average wind movement for the previous 9 years is 4,741. The wind movement for December totaled only 2,677 miles, which is the lowest total for any month since the records have been kept on the project.

*Farming operations.*—The farmers have been unable because of weather conditions to accomplish a great deal. Some hay has been hauled and shipped, and the regular routine of chores performed. Forty-five cars of baled and chopped alfalfa hay were shipped during the month; also 8 cars of sheep and 4 cars of apples.

*Labor conditions.*—Little work was attempted during the month and labor conditions were easy.

*Operation and maintenance.*—The feed canal was operated for storage from the 1st to the 8th, inclusive. Water was delivered to the Echo Mills throughout the month, except from the 14th to the 21st, and again the 24th, when water was cut out at the request of the railroad company. On the 5th ice began forming extensively in the canal and it was necessary to decrease the head. On the 8th ice jams had formed against the piers of highway bridges to such an extent as to require the spilling of the head at spillway No. 1. This left the lower end of the canal full of water, which froze to a thickness of from 6 to 10 inches before the canal could drain. On December 13 a total of about 1 foot of snow had fallen upon the frozen ground. On December 20 light showers and moderate temperatures began, but alternated with freezing conditions until the 23d. On this date a chinook wind and a rain on the upper reaches of Stage Gulch caused a flood. The main crest of this flood reached spillway No. 2 on the feed canal at about 11 a. m. the 24th. Because of heavy ice in the canal it was not possible to handle the head of approximately



175 second-feet which entered the canal. Two breaks occurred at stations 690+00 and 775+00. More serious trouble would have been had in all probability had not the ditch been dynamited at about station 945+00. It is estimated that the maximum flow from Stage Gulch into the feed canal was about 800 second-feet, 625 second-feet of which was handled by the spillway. The damage to the feed canal probably totaled \$800. The railroad was washed out below the break at station 690+00 where the track crosses a draw with a long fill unprotected by a siphon. The Oregon-Washington Railroad & Navigation Co. and the town of Stanfield suffered very greatly from the flood. The Service was undoubtedly saved by the deep frost in the canal banks, which allowed the canal to overflow in a number of places without serious breaks. The flood in Stage Gulch exceeded in maximum flow that of any previously experienced since the building of the feed canal. The run-off began much as previous floods had occurred, and it was at first thought that no serious flood would be had. Under the conditions which were encountered it is believed that as a whole the Service escaped with the minimum damage possible.

Maintenance work consisted chiefly in minor repairs to structures and protection of river bank. The crop census was completed and inventory begun.

*General.*—The chief matter of interest on the project during the month was the election of the Hermiston irrigation district, held in Hermiston, Oreg., on December 15. The formation of a district carried with a vote of 106 for and 4 against. Messrs. J. F. McNaught, E. L. Jackson, and Frank Waugeman were elected directors. Organization steps are being taken,

and the new district expects to enter into a contract with the Service for the proposed betterments to canal "A" at an early date.

*Visitors.*—The official visitors during the month were H. L. Holgate, district counsel, and Darwin G. Tyree, assistant district counsel.—*Maurice D. Scroggs.*

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

December was very unfavorable for outdoor work on account of snow and extreme cold. The maximum temperature was 55° and the minimum —16. The minimum is 2° lower than the minimum temperature heretofore recorded since weather records have been kept at Klamath Falls covering a period of 10 years. Since about Christmas the weather has been comparatively mild and favorable for outdoor work, although frozen or wet ground has prevented any considerable working of the soil. The total precipitation for the month was 2.21 inches. The average precipitation for December, based on a 10-year record, is 1.34 inches; the total precipitation for the year is 9.4 inches, which is the lowest with the exception of 1905, when the precipitation was 8.32 inches.

Labor conditions continue about the same. Men are not plentiful even with some of the logging camps closed down. Wages vary from \$4.50 to \$5 per day.

Little maintenance work was done. The latter part of the month a crew of four men was employed working over the Olene flume and placing lateral bracing.

On December 9 the Sunnyside, Malin, and Shasta View irrigation districts were notified that the United States would entertain requests for contracts to purchase water rights at an estimated price of \$28 per

#### Crop report, Umatilla project, Oregon, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	6,837	Ton.....	25,836	3.8	\$18.70	\$483,133	\$70.66
Alfalfa seed.....	68	Bushel.....	180	2.6	17.53	3,155	46.40
Apples.....	583	Pound.....	1,389,015	2,382	.049	68,062	116.74
Barley.....	38	Bushel.....	1,673	44	1.55	2,593	68.24
Corn, Indian.....	108	do.....	3,202	29.6	1.43	4,579	42.40
Corn, fodder.....	200	Ton.....	1,098	5.5	9.22	10,124	50.62
Fruits, small.....	50	.....	.....	.....	.....	6,723	134.46
Gardens.....	69	.....	.....	.....	.....	7,593	110.05
Hay, other.....	258	Ton.....	230	.9	15.14	3,482	13.50
Pasture.....	539	.....	.....	.....	.....	13,883	25.76
Pears.....	13	Pound.....	86,245	6,634	.033	2,846	218.92
Peaches.....	97	do.....	508,348	5,241	.025	12,709	131.02
Potatoes.....	49	Bushel.....	2,830	57.8	1.92	5,434	110.90
Rye.....	11	do.....	80	7.3	1.96	157	14.27
Watermelons.....	21	Ton.....	92	4.4	30.11	2,770	131.90
Wheat.....	18	Bushel.....	240	13.3	2.03	487	27.05
Miscellaneous.....	87	.....	.....	.....	.....	5,650	64.94
Less duplicated areas.....	582	.....	.....	.....	.....	.....	.....
Total cropped.....	8,464	Total and average.....	.....	.....	.....	633,380	74.83
			Areas.		Acres.	Farms.	Per cent of proj- ect. <sup>2</sup>
Irrigated, no crop:							
Nonbearing orchard.....	215	Total irrigable area farms reported.....	17,402	507	62.0		
Young alfalfa.....	1,828	Total irrigated area farms reported.....	10,533	507	37.5		
Miscellaneous.....	219	Under water-right applications.....	8,951	411	31.9		
Less duplicated areas.....	193	Under rental contracts.....	219	10	.8		
		Miscellaneous.....	1,363	98	4.8		
Total irrigated.....	10,533	Total cropped area farms reported.....	8,464	507	30.0		

<sup>1</sup> Maxwell rental contract lands, 278.5 acres; vested water-right lands, 61.45 acres; 12 farms duplicated; sandy area rental, 734.35 acres; department regulations, 39.5 acres; Maxwell water-right lands, 249.45 acres.

<sup>2</sup> 28,100 acres.

acre, the districts to pump water at their own expense from Government canals. The contracts would also contain provisions protecting the lands of the Klamath irrigation district from damage by seepage on account of the conveyance of water for the proposed pumping districts. Contract for a water right for the Enterprise irrigation district was approved as to form and is now before the water users. It is expected that at the election on January 13 the directors of the district will be authorized to execute the contract.—*Herbert D. Nevell*.

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

The first half of December was very cold. The temperature from the 9th to the 12th, inclusive, stayed below zero with a minimum of  $-20$ . After the middle of the month, however, the weather warmed up and was clear and pleasant. Very little heavy wind occurred during the month and only 0.24 inch of precipitation.

The only operation work carried on was in connection with the diverting of water from the Belle Fourche River into the reservoir, the total amount diverted being 14,004 acre-feet. No difficulty in connection with ice was encountered in the operation of the inlet canal. The full flow of the river was carried into the reservoir and storage at the close of the month was 100,360 acre-feet.

No maintenance work was undertaken on account of weather conditions.

It is planned as soon as weather conditions will permit to begin the manufacture of concrete pipe to replace the wood-stave pipe in the town site lateral near Newell. Forms for making the pipe have been requisitioned from Strawberry Valley project and as soon as they arrive work will be commenced under shelter.

It is also planned to start a crew at work at an early date on repairing and remodeling the Indian Creek flume; the progress of this work will depend on weather conditions.

There was little activity in real estate transactions and no filings made on Government land. Only two units remain subject to entry within the limits of the project.

All crops, except a small amount of sugar beets, were harvested before the beginning of December, but there are a number of fields of grain yet unthreshed and a small part of this is unstacked and remains in the fields.

On account of the early setting in of winter the price of alfalfa took a jump from \$15 to \$25 per ton in the stack in November. It is now impossible to buy alfalfa hay for less than \$30 in the stack and very little is offered even at that figure. Strawstacks all over the project are being used as feed for stock and some have sold at a good figure.

Project cattle are usually in fairly good condition, but there has been considerable loss in both cattle and sheep which were driven in from the range. Much of this stock was in such poor condition when it arrived that the severe weather literally froze numbers to death. The loss throughout the country has been exceptionally heavy; the very mild weather for the past 15 days, however, has helped out the situation considerably, and if it continues favorable without too many interruptions it is hoped that stockmen will be able to carry most of their remaining herds through without very much more loss. Some lambs were sold locally at as low as \$1.75 each, on account of the shortage of feed to carry them through the winter.—

*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

December was generally stormy with a great deal of snowfall and very cold weather. The elevation of the water of the reservoir increased from 7,546.1 to 7,546.5.

Both labor and teams were plentiful but weather conditions were unfavorable for both farming and construction operations.

The load on the power plant increased considerably over November, due to a new alfalfa feed mill at Payson commencing operations and the flour mill at Leland operating with electrical energy instead of water power.

The repair work at the Strawberry Tunnel was stopped on the 15th on account of the heavy snows making the road impassable and there not being sufficient work on hand to warrant the expense of keeping the road open.

Satisfactory progress was made in the collection of construction and operation and maintenance charges and at the end of the month 83 per cent of the charges due had been received.

A contract was entered into with Payson City providing for the sale of 1,200 acre-feet of water to that municipality. The unit price of the water is \$61.86 per acre-foot and the total amount of the contract is \$74,232.

An order has been placed by the Denver office for the purchase of an electrically operated truck for use in making repairs to the Strawberry Tunnel, together with storage batteries and charging unit.

Advertisements were issued for new runners and other repair parts for the water wheels in the Spanish Fork power plant.

On account of the unfavorable weather conditions the investigation work on the Castle Peak project was discontinued on December 12 and the greater part of the personnel discharged. The working up of the field notes will be continued in the Provo office.

Good progress was made on the compilation of a preliminary estimate of the cost of the Juab County Canal.

On November 28 and 29 representatives of the water users on the project and the cattle and sheep men from Heber and Wasatch County were given a hearing relative to the policy to be followed in the future in the handling of the project grazing lands in Strawberry Valley. The parties concerned informally agreed that the land would be leased to the water users and the water users in turn would sublease part of it to the horse and cattle interests of Wasatch County.—*J. L. Lytel*.

#### OKANOGAN PROJECT, WASHINGTON.

From December 2 to 17 very cold weather prevailed, with light snowfalls over the project lands and watershed. The weather stopped the hauling and shipping of apples, due to an embargo placed by the railroad. During the latter part of the month this embargo was raised and the apple crop again began moving, but at the end of the month over one-half of the crop was in local storage. Prices of many of the varieties of apples have dropped during the month, with practically no sale for the later varieties. The price of alfalfa remained at \$25 per ton in the stack. The regular routine office work was carried on with but a nominal amount of maintenance work. The crop report was practically finished in the field and a small part of the office work done. The following month the crop report will be finished and the writing of the project annual report and history will be under way.—*Calvin Casteel*.



## SALMON LAKE DAM.

During the first half of December extremely cold weather prevailed, but the weather of last half of the month was mild. Most of the ice and frost formed during the very cold weather of the first half of the month had disappeared by Christmas. The snowfall to date has been light.

The local labor supply is sufficient for all work in progress.

Work on Salmon Lake Dam was limited to the placing of a small amount of riprap on the upstream face of the dam.

The excavation of the feeder canal from the North Fork of Salmon Creek to Salmon Lake Reservoir was completed. The concrete lining in this canal will not be placed until spring.

A drainage trench was excavated at the downstream toe of Conconully Dam. This required the removal of 1,685 cubic yards of class 1 wet material. Placing tile and filling the trench with gravel were started the last of the month.

The steam shovel, which has been in use at Salmon Lake Dam, was overhauled and moved to the site of the road around the reservoir. The last week of the month was spent on road excavation, 1,979 cubic yards of class 1 and class 2 material being moved.—*L. V. Branch.*

## YAKIMA PROJECT, WASHINGTON.

The temperature for December was considerably below normal, severe cold weather prevailing during the first half of the month, the coldest of record for a number of years.

*Operation and maintenance.*—Owing to the very cold weather little was accomplished in the way of maintenance work.

On the Sunnyside unit work consisted of grubbing willows, cleaning metal structures, and hauling and placing gravel on canal slopes. Inspection and overhauling of the various pumping plants were also in progress.

On the Tieton unit maintenance work consisted of replacement of small pipe lines and flumes, including the installation of 1,200 lineal feet of 12-inch wood-stave pipe to replace unreinforced concrete pipe. Delivery of water for the filling of cisterns was interrupted early in the month by severe weather conditions which caused slush ice to collect below the headgates of main laterals. Delivery of cistern water was again resumed about the 20th of the month.

*Construction.*—A crew of from 10 to 15 men was employed during the fore part of the month removing forms at the reconstructed transition to Tieton Tunnel, delivering materials for lining in the bottom of this tunnel, and pouring concrete for the 12-inch enlargement immediately above the new transition.

*Investigation and surveys for new units, Kennewick unit.*—Field work was suspended on December 15 and will be completed when weather conditions are more favorable. Office work on designs for this unit was prosecuted with a force of six men.—*R. K. Tiffany.*

## SHOSHONE PROJECT, WYOMING.

The first three weeks of December were unusually cold. About 4 inches of snow fell from the 6th to the 11th, which was drifted by the high winds. The coal shortage was relieved on December 10, and by the 20th shipments which had been held up pending settlement of the strike were released. The last week in

December temperatures were mild for this section of the country and the chinook winds melted the snow drifted in the valleys.

*Water supply.*—Due to the extremely cold temperatures, ice had formed on the surface of Shoshone Reservoir and it was impossible to determine the exact gage heights and storage or the inflow from the North and South Forks of Shoshone River. The inflow was estimated at 24,595 acre-feet, the outflow from the reservoir 36,131 acre-feet, and the surface of the reservoir dropped at least 2.7 feet during the month. Both balanced valves have been closed throughout the month and all water discharged was through one 42-inch opening in the base of the dam.

*Operation and maintenance.*—Due to the early winter, only two-thirds of the maintenance work that was outlined for completion in the fall of 1919 has been completed. The principal work to be completed in the spring of 1920 before the operation season commences will be 20 miles of lateral and sublateral cleaning in the Garland and Frannie divisions, riprapping the banks of Deaver Reservoir, and cleaning silt from about 9 miles of the Frannie Canal in the Garland division with the Monighan drag line. During the month ice was cut around the tower at Ralston and inspection was made of the closed and open drains. The drains were found to be in good condition except where the construction was in quicksand, and some repairs will be necessary where settling has caused partial failure of the lines.

*Crops.*—The crop report for the Garland and Frannie divisions shows a gross return of \$1,886,977 from an area cropped of 41,016 acres. Lack of precipitation throughout the growing season cut down the average yield of cereal crops, although the wheat yield was somewhat better than was estimated early in the fall. The potato crop was a disappointment, the yield per acre being about half that secured in 1918. Alfalfa averaged half a ton heavier yield than heretofore secured. The beet acreage was small but better than in previous years. Shipments of alfalfa hay and meal have been heavy and some straw has been sold to stockmen in drought-stricken portions of Montana. The shipment of sheep and cattle onto the project for winter feeding has utilized a portion of the Garland division alfalfa crop. Live-stock shipments consisted of 2 cars of hogs to market in Omaha.

*Labor.*—On account of climatic conditions no field work was in progress and there was no requirement for labor. Local demands have been more than supplied, but there has been no decrease in the high wages in effect.

*Construction.*—On account of frozen ground and extremely cold and stormy weather, only a small amount of construction work was attempted in December on the Frannie division. One contractor on the Frannie Canal extension excavated 2,650 cubic yards of class 1 and 100 cubic yards of class 2 material. The contract earthwork in the third unit at the end of December was 92 per cent complete. No construction by Government forces was in progress on the project.

*Drainage.*—No field work was in progress. A small force was engaged on miscellaneous repairs to excavating machinery. If weather conditions permit, the Bucyrus drag line will be moved to the Frannie division early in January, and as soon as the frost is sufficiently out of the ground work will be started on drainage of the so-called Howell tract. In the Powell office maps have been prepared and studies made of a plan for draining the Dry Lake area in the Garland division and tabulation of data secured from investigations of the subsoil and ground water conditions

during the season are in course of preparation. Preparations were made for beginning drainage investigations in the Frannie division.

*Field and office engineering.*—One party of four men was engaged for three days on a preliminary survey of an extension of the Hart Mountain Canal to irrigate Polecat Bench. Due to extremely cold weather, only about 8 miles of transit stadia line were run. During the first part of December, before the survey parties were disbanded for the winter months, 200 acres of nonirrigable land surveys in the eighth unit, Frannie division, were completed. In the Powell office drainage investigations for the season were tabulated and maps made of the plans for future work in the Garland division. Engineering data for yearly reports were assembled and considerable work was done on tabulation and determination of drainage costs. Maps of the Garland and Frannie divisions showing names of unit holders were brought up to date, right-of-way descriptions for the eighth unit, Frannie Canal extensions and laterals through Northern Pacific lands, were prepared and examination and reclassification were made of withdrawals and restoration records of the project; compilation of project history and a new general map of the project was in progress. The Deaver office completed one road map of Big Horn and Park County and several maps for the 1919 project history.

*Water users' association.*—The regular meeting of the board of directors of the water users' association was held at the project office on December 8. A number of claims for damage and relief and the budget for operation and maintenance work for the 1920 season were considered and recommendations made.—A. H. Ayers.

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

During the first half of December weather conditions were very severe. The temperature was low, with several snowstorms and high winds. The last half of the month was mild and pleasant except for high winds.

No field work of any kind was done. The project force was cut to a minimum, the only employees at the end of the month being the office force, whose time is divided between the Blackfeet project and the St. Mary storage unit.

The only farm work consisted of feeding stock and thrashing, which was delayed on account of severe weather earlier in the fall. Some of this still remains to be done.—R. M. Snell.

##### FLATHEAD PROJECT, MONTANA.

Roads were generally good during December. The first half of the month was cold, but the latter part much warmer. No difficulty is being experienced in securing sufficient labor.

*Construction.*—The earth embankment at McDonald Lake Dam was completed during the month by the placing of 28,600 cubic yards of material, thus making a total of 114,000 cubic yards placed since the embankment was started on September 9.

Preparations are being made for starting the rip-rapping of the upper slope of the embankment.

A track will be run to a neighboring rock slide and the same steam shovel and narrow-gage trains that were used for excavating and hauling the earth will be used for handling the rock.

On the Polson A lateral the force was reduced con-

siderably. Three thousand two hundred cubic yards of material were excavated.

The frozen ground encountered on the Pablo by-pass canal made it necessary to discontinue digging with the Monighan drag line on the 1st.

Other construction work has been discontinued for the winter.

Two survey parties are making irrigable area surveys.

*Operation and maintenance.*—The operation and maintenance forces were reduced to those necessary to maintain the camps during the winter. Material is being cut up and made into structures in the yards preparatory to installation in the spring.

Official visitors were Engineer James Munn and Examiner A. H. Gullickson.—F. T. Crowe.

##### FORT PECK PROJECT, MONTANA.

The first of December was unusually cold but the last 10 days of the year were more seasonable. The minimum temperature was 31° below zero and the maximum 43° above. The mean for the month was 9.89° above, which was 5½° below normal for December. There was 0.02 inch of precipitation.

Work was carried on at Big Porcupine storage reservoir on the construction of the fore apron. It was possible to complete the outlet structure and to place the drain tile running parallel with the dam with the exception of about 50 feet across the creek channel.

The warm weather the latter part of the month reduced the coal demand and the country got through the coal shortage in good condition with the coal from the local lignite mines.

It has been necessary to feed the range stock through the month and several carloads of hay and oil cake have been shipped in.

No operation or maintenance work has been carried on. The Government stock has been at the Poplar River camp for winter pasturage.

Office crew has been employed on estimates for Big Muddy diversion canal and studies of evaporation and storage conditions for Medicine Lake storage.—R. M. Conner.

##### RIVERTON PROJECT, WYOMING.

The weather during December was unusually cold, a minimum of -42° being recorded at Riverton on December 9. There was considerable snow on the ground, which drifted badly at times and made working conditions unfavorable. The roads were in fair condition, although obstructed at times by drifts.

The two Bucyrus drag-line excavators were being moved toward the Wyoming Canal, making about 20 miles during the month. Their progress was at all times handicapped by drifting snow and low temperature; they were twice obliged to suspend operations for several days. The building of a construction camp was continued.

A considerable amount of material for telephone line, equipment for machine shop, and construction supplies has been received at Riverton.

Topographic surveys have been continued by three parties. Progress has been slow, owing to unfavorable weather conditions. One survey camp was closed on December 10.

The petition for the organization of the Midvale irrigation district on this project was signed by the Acting Secretary of the Interior on behalf of the public land included. This petition has now been signed by 62 per cent of the landowners, who own 81 per cent of the total number of acres.

(Continued on page 102.)



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

### Progress Reports.

(Continued from page 101.)

The construction of a warehouse at Riverton was completed.—*H. D. Comstock.*

#### GENERAL OFFICES.

*Washington office.*—The director and chief engineer was in charge of the office during December.

Mr. H. T. Cory has continued his work in connection with soldier-settlement legislation. He has recently been appointed a member of an International Engineering Commission, consisting of himself and a British and a French engineer, to make a study of the "larger Nile project" with a view to a proper adjudication of the water and the allocation of costs. Mr. Cory expects to sail for Egypt the latter part of January, and will return to the office in about four months.

Among the visitors at the Washington office during December were the following: A. J. Rossborough, vice president of the California-Oregon Power Co.; Messrs. McPherrin, Kibby, and Nelson, of the Imperial Valley, Calif.; E. F. Blaine and Judge Kauffman, of Washington; Hugh L. Cooper, engineer; Mr. Swendsen, State engineer, and Messrs. Bickel, Fuller, and I. B. Perrine, of Idaho; Capt. H. S. Reed, of Arizona; Attorney General Cureton, of Texas; Mr. Donham, of the Tri-State Land Co., of Nebraska; J. T. Whistler, of Denver; Richard L. Humphrey, consulting engineer, Philadelphia; Dr. Perisho, of South Dakota; and J. F. Harbert, of the Flathead project, Montana.

Mr. F. E. Weymouth, chief of construction, arrived at the office on January 10 for a series of conferences in regard to reclamation.

Mr. R. K. Tiffany, project manager of the Yakima project, arrived in Washington, D. C., on January 13

and renewed his acquaintance with the officials of the office.

*Denver office.*—The chief of construction was in the office during December until the 27th, when he left for the Minidoka project for conferences relative to American Falls matters. Assistant Chiefs of Construction R. F. Walter and Charles P. Williams were in the office the entire month. The only official visitor was Project Manager Andrew Weiss.—*F. E. Weymouth.*

### DECEMBER WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

December, 1919, in the Western States showed remarkable contrasts in temperature, while the precipitation was usually less than normal, particularly in the Pacific States, the Plains States, and near the Canadian and Mexican borders. The first half of the month was one of the coldest periods ever recorded in most of the far Northwest, and was decidedly colder than normal in all interior districts north of about 37° latitude; yet near the Mexican border and along the southern California coast the temperature was comparatively near normal. The latter half of the month was much warmer than normal in Montana and the Dakotas, and somewhat warmer than normal in other western districts, save in the Plateau region from southern Idaho southward to northern Arizona. The month averaged warmer than normal in most of Arizona and New Mexico, and parts of Colorado and California, but elsewhere in the West colder than normal, particularly from eastern Washington and northern Idaho southeastward to Utah and western Colorado, in which region some stations averaged from 10° to 15° per day colder than normal.

In the north Pacific region, particularly Washington, the first half was comparatively dry, the latter half quite rainy; but elsewhere the first half had most of the precipitation, which fell chiefly as snow, save in the lower elevations of California. The latter half of the month was notably dry from southern California to northern New Mexico and Colorado.

The month had more precipitation than normal over the greater part of Colorado, and generally in southern and western Wyoming, southern Montana, northeastern Arizona, northern Utah, western Nevada, and eastern Oregon. But as a rule the month's precipitation in the West was less than normal, especially in the Plains States and near the Mexican boundary.

The first half of the month was emphatically unfavorable for stock and for outdoor operations in all but the Southern States, but the latter half was mainly favorable. Near the Mexican border the whole month was favorable; also in spite of some frost damage the month was rather favorable in California.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

HON. FRANKLIN KNIGHT LANE, Secretary of the Interior.  
 ALEXANDER T. VOGELSONG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN W. HALLOWELL, Assistant to the Secretary  
 E. J. AYERS, Chief Clerk.  
 Brig. Gen. WILLIAM L. MARSHALL, United States Army, retired, consulting engineer to the Secretary.  
 ARTHUR POWELL DAVIS, Director and Chief Engineer of the Reclamation Service.  
 WILL R. KING, Chief Counsel of the Reclamation Service.  
 CLAY TALLMAN, Commissioner of the General Land Office.  
 CATO SELLS, Commissioner of Indian Affairs.  
 GAYLOED M. SALTZGABER, Commissioner of Pensions.  
 JAMES T. NEWTON, Commissioner of Patents.  
 PHILANDER P. CLAXTON, Commissioner of Education.  
 GEORGE OTIS SMITH, Director of the Geological Survey.  
 VAN H. MANNING, Director of the Bureau of Mines.  
 STEPHEN T. MATHER, Director of the National Park Service.  
 Col. F. MEARS, Chairman Alaskan Engineering Commission.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Office of the director and chief engineer: Morris Bien, assistant to the director; J. B. Beadle, secretary to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor Reclamation Record; E. C. Bebb and C. A. Bissell, engineers; J. H. Pellen, chief draftsman; F. L. Cavis, chief accountant; A. H. Gullekson, western district, Yakima, Wash., C. E. Platt, southern district, Denver, Colo., F. G. Hough, northern district, Helena, Mont., examiners of accounts; C. A. Lyman, chief of repayment accounts section; C. E. Harris, auditor of transportation accounts; Mrs. J. T. Davis, chief of auditing section; Miss H. A. Fellows, fiscal agent; C. H. Fitch, chief clerk; C. N. McCulloch, chief of mails and files section; Emmet Carr, purchasing agent; T. E. Brown, chief of stenographic section; G. W. Numbers, appointment clerk.

Office of the assistant to the director: D. H. Sibbett, J. E. Golladay, and A. G. Pollock, counsel; Mrs. G. B. Mathiot and Alfred Dresser, assistant counsel; Mrs. E. W. Ballard, C. E. Womersley, and D. S. Koontz, clerks.

Office of the chief counsel: Ottamar Hamels, assistant to the chief counsel; Geo. A. Ward and E. W. R. Ewing, counsel.

## DENVER OFFICE.

F. E. Weymouth, chief of construction, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chiefs of construction; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; E. A. Moritz, office engineer; J. L. Burkholder, drainage engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; S. E. Hedden, disbursing officer.

## FIELD OFFICES OF CHIEF COUNSEL.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Denver, Colo.**—Law section office of chief of construction: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel. Office of irrigation district organization: E. W. Burr, district counsel; also in charge North Platte and Belle Fourche Project. Office of land titles: E. H. Peery, district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel; T. F. Fly, assistant district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Eggleston, district counsel, Helena, Mont. Projects: Black feet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects:

Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—O. P. Morton and R. J. Coffey, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Truckee-Carson.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise Idaho; E. R. Mills, chief clerk; C. F. Weinkauf, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—R. H. Fifield, project manager, Ballantine, Mont.; G. H. Bolt, chief clerk and fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; E. B. Smith, chief clerk; L. D. Eakin, chief clerk.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; C. C. Hogue, chief clerk; E. V. Hilius, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont. E. E. Chabot, chief clerk; J. A. Keever, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melaas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; J. R. Ummel, chief clerk; O. K. Barnes, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanoga, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association: W. R. Elliott, project manager, Phoenix, Ariz.

**Shoshone Project.**—A. H. Ayers, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; C. E. Brodie, fiscal agent.

**Strawberry Valley Project.**—J. L. Lytel, project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; L. H. Kline, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—F. D. Pyle, project manager, Montrose, Colo.; A. H. Peach, chief clerk; C. B. Funk, fiscal agent.

**Yakima Project.**—R. K. Tiffany, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppelmann, chief clerk; E. M. Phlebsaum, fiscal agent.

## INDIAN PROJECTS.

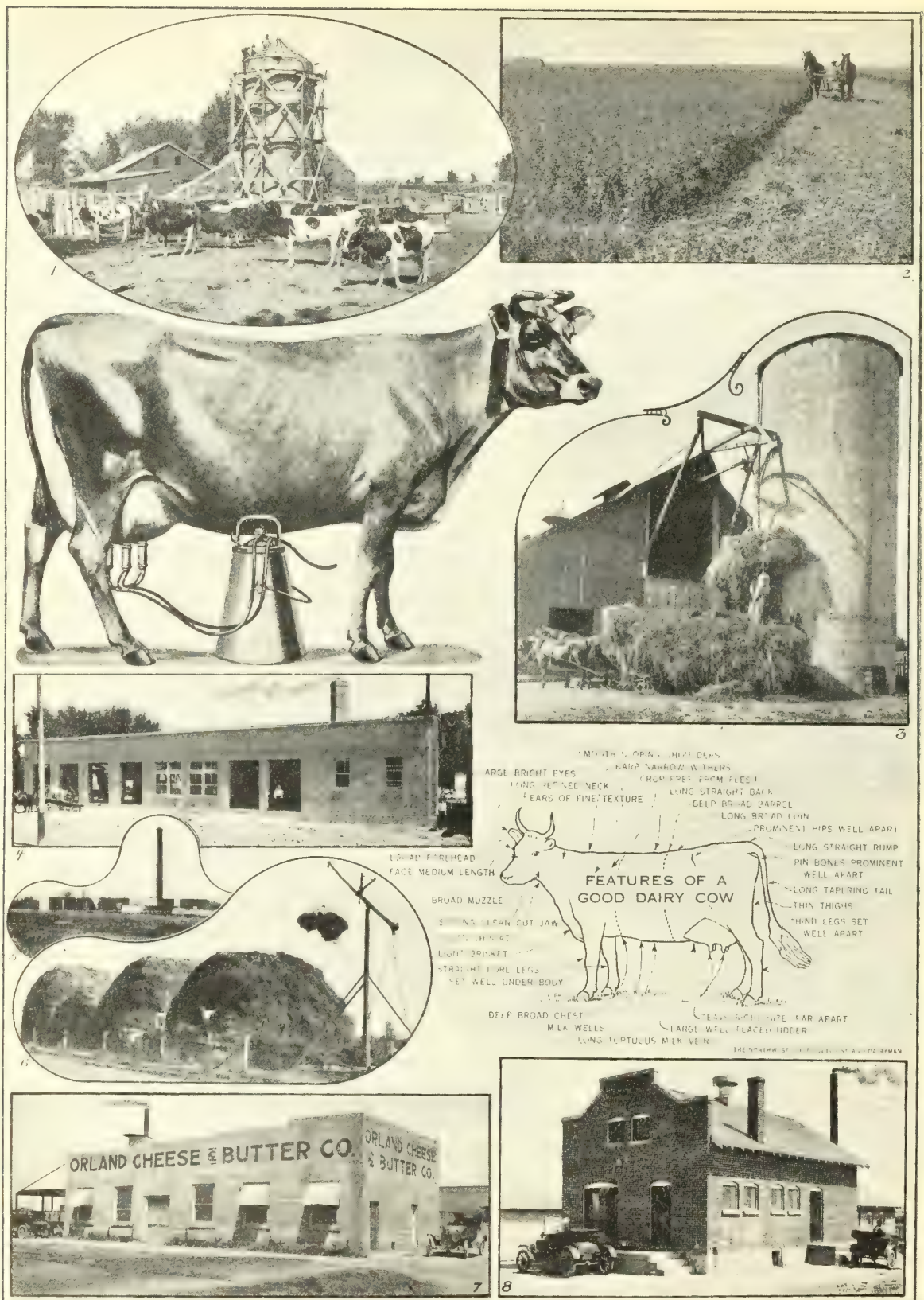
**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

**Flathead Project.**—F. T. Crowe, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; R. V. Sass, superintendent of construction; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk and fiscal agent.





#### DAIRYING ON OUR PROJECTS.

1. J. H. Herron's ranch, Grand Valley project.
2. Alfalfa on Elmer Eiker's ranch, Huntley project.
3. Herold ranch, Orland project.
4. Jensen creamery, Grand Valley project.
5. Carnation milk condensery, Boise project.
6. Eagleson's ranch, Boise project.
7. Orland Cheese and Butter Co.
8. Creamery at Kuna, Boise project.

# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

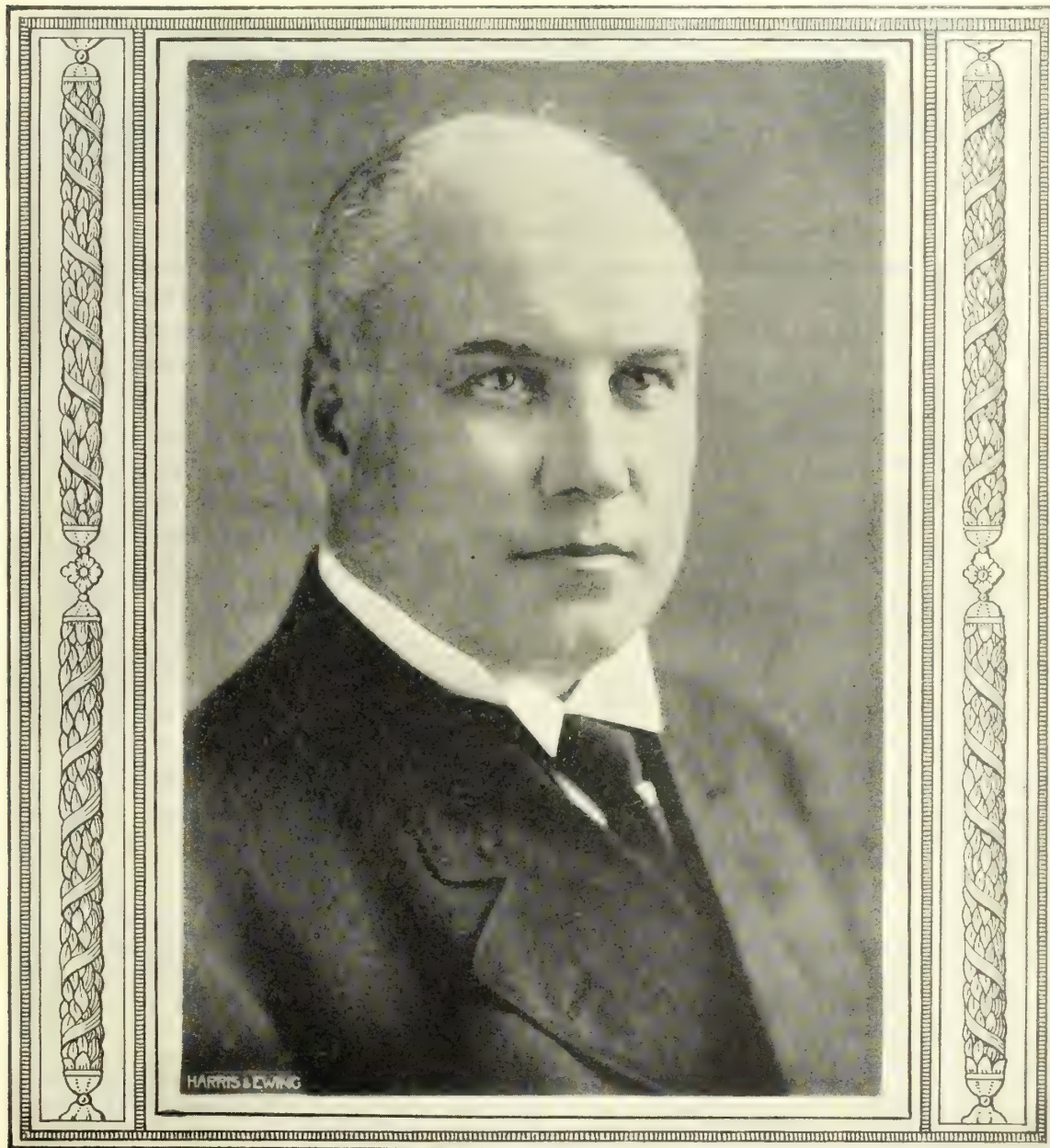
**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURER INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

VOLUME 11, No. 3

PRICE (NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

MARCH, 1920



FRANKLIN K. LANE, RETIRING SECRETARY OF THE INTERIOR.



### SECRETARY LANE LEAVES DEPARTMENT OF THE INTERIOR.

After 21 years in the public service, Franklin K. Lane, Secretary of the Interior, retires on March 1, 1920, as head of the great Department of the Interior, to reenter private life.

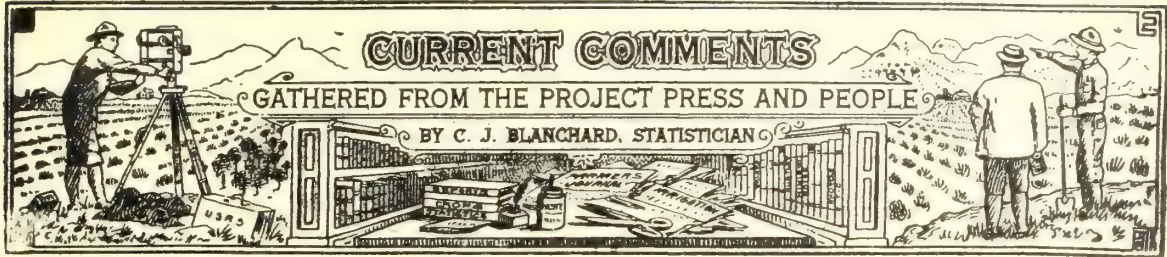
Secretaries of the Interior have come and gone, but we venture to say that, to a preeminent degree, Secretary Lane has endeared himself to the employees of the department. He will be missed, not alone by those in authority—the chiefs of bureaus and their immediate assistants—but by the rank and file comprising the great working force of the department in all its varied ramifications. The reason for this is not far to seek. Secretary Lane is, above all, human. There is a personal aspect about his relations with the department employees which is very real and genuine. Their interests have been his interests, and the employees as a body have appreciated this and have supported him loyally through his term of office as their head. Perhaps no better sidelight on the mutual affection which exists between the employees and Secretary Lane can be gained than from the following quotation from the Secretary's letter of resignation to President Wilson:

"I return this department into your hands with very real gratitude that you have given me the opportunity to know well a working force holding so many men and women of singular ability and rare spirit."

The department as a whole voices the expression of President Wilson in the hope that Secretary Lane's future career will be as full of honorable success as his past.

## JOHN BARTON PAYNE NEW SECRETARY OF THE INTERIOR.

As we go to press announcement is made of the appointment of John Barton Payne, Chairman of the Shipping Board, as the new Secretary of the Interior.



During the hearings on the soldier-settlement bill, which was reported out favorably and took its place on the calendar, opposition to the bill was voiced on the ground that there was no apparent demand for farms on the part of the men who had worn the uniform of the United States, despite Secretary Lane's statement that 150,000 men had signified their willingness to go to work to earn a farm.

Last month at the request of the American Legion's legislative committee in Washington, the House and Senate in a joint resolution granted to honorably discharged officers, soldiers, sailors, and marines a preference right of entry for 60 days on all lands thereafter opened on the public domain or on Indian reservations for a period of 2 years. Three weeks preceding the passage of the resolution Secretary Lane issued public notice opening to entry about 10,000 acres on the North Platte and Shoshone irrigation projects in Wyoming, aggregating 144 farms. The responses to this announcement indicated a very great interest in the openings and about 5,000 requests for literature and details of the drawings were answered. Many of these were from former soldiers and not a few expressed the hope that a preference right be granted them in filing on the land.

Secretary Lane decided to make the joint resolution applicable to both these openings and so announced in the public press, and then the fun began.

An avalanche of letters and telegrams from the discharged fighters began pouring in. Squads of men in uniform and civies swarmed into the Secretary's office, the Land Office, and the Reclamation Service, eager, questioning, and keenly aroused at the hope of getting a farm. Farmers' sons, mechanics, artisans, engineers, aviators, every class and profession were represented, but each one sincere in his desire to get a piece of land and start home making. This was no charity-seeking crowd. Everyone of them understood that no real gift was being made to him beyond granting the soldier a better chance to file for land than the civilian. He understood that only by the

expenditure of his own money and a strict compliance with the law would he be permitted to enter the race for a home.

All day long the telephone rang, and mostly its voice was that of an agitated Congressman asking what about this opening of land in Wyoming. Send me a bunch of literature; a lot of my constituents are writing and telegraphing me about it. The daily mail during the second week in February, as this is written, is running as high as 500 letters. During the same period there has been an average of 25 personal inquiries a day. Meanwhile, the project managers, the colonization agents of the railroads, and the State land commissioner have been reporting an unprecedented interest in the openings.

With civilians barred for 60 days after the openings on March 5 and 13, there isn't a chance for them. To the hundreds of these who have been waiting for several years the opening of these lands, we extend our sympathy, although we are sure that not one of them would stand in the way of the soldier lad who wants his farm.

This demonstration of land hunger on the part of thousands of soldiers who are willing to finance themselves if the land is offered them, should be convincing evidence that if land similarly were made ready for these boys in New England, in the South, or anywhere else in the good old United States the response would be equally strong.

Don't forget this big, outstanding fact—the making of a home on a farm unit in a Wyoming reclamation project is a real man's size job. It isn't a summer picnic. It's a lot of hard work and demands capital also—from \$1,500 to \$2,500. For most of these boys it means a long ways from home and mother and old friends, the making of new friends, and as a rule an entire change in methods of living. It means a struggle for a number of years with Nature in her unkindest mood. This is no place for the molly-coddle or the time-clock observer. But for the real he-man and the true she-woman this is the land where the biggest dreams come



true. In the crucible of the West the elements are being mixed to bring forth citizens whose broad shoulders and patriotic spirit are unfailing guarantees of our Nation's future stability.

Let us not falter in our efforts to create larger and more abundant opportunities for this type of American to establish himself on his own land, be it only a modest lot in the town, or the farmlet near by, on the land of the golden West, in the Northland, or in the sunny Southland. This Nation will never be so poor that a national forward-looking policy of homemaking for the land-hungry can not be worked out successfully. Was there ever a more propitious time in our Nation's history in which to initiate such a policy?

#### NOTED HERE AND THERE.

*Arizona, Salt River project.*—What is believed to be the top price for ranch land was reached recently when E. E. Morrison sold his 40-acre ranch to J. W. Dobson for \$525 per acre. The deal was a cash transaction, Mr. Morrison receiving \$21,000.

This place is just on the edge of the proposed incorporated town of Chandler and only has an average amount of improvements, including a small house, hay barn, corrals, and fences. It is excellent soil. The purchaser is a brother of J. H. Dobson, and has been visiting here from Canada for several weeks.

Death has recently called away one of Salt River Valley's best advocates and one of our best friends in the Southwest, the editor of Arizona, C. S. Scott. From the beginning of our acquaintance back in 1900, Scott is remembered as a sincere and devoted worker for everything that made for the betterment of the valley. A clear thinker, a clever writer, and with remarkable prescience and vision, Scott in editorial and story drew pictures of the future of Salt River Valley which he lived to see in reality. It was a delight to meet him, and our future visits to Arizona's wonderland are going to be saddened by his absence. Clearly he lived, adversity and protracted illness could not discourage him, and during the many years his pen never wearied in the splendid work of making the world familiar with the greatness of the spot he had chosen as his home and in which he now has found rest.

The record price for cotton which, it is believed was ever paid in the Salt River Valley for long staple was made recently, when John H. Dobson sold 40 bales of lint for approximately \$10,000, or at the rate of 90 cents a pound. The top price was reached last year when the record mark went to 78 cents.

*California, Orland project.*—Real estate transfers continue to prove the increasing popularity of Orland, "The Project of No Regrets." One real estate firm in a single month closed 20 deals aggregating \$200,000. Among the purchasers are G. W. Cowan, W. L. Dresbach, and Hiran Danneker from the Twin Falls, Idaho, country.

The growing importance of Orland as distributing center for high-grade live stock was again emphasized in the auction sale of Holstein cattle held on the J. N. Cook place recently. Forty-nine cattle, all of choice strains, were sold over the block, Col. H. Garrison of Chico being the auctioneer.

The cattle were the property of J. N. Cook, of Orland, and F. J. Austin, of Willows. The animals were all

tuberculin tested, and were all from families that have made names for themselves in the dairy world. The advertisement of the sale brought bidders from every direction, and the bidding was active throughout the sale. There was not a scrub animal in the bunch, and every head offered for sale went at a price that surprised the onlookers. An average of \$150 was realized for the entire 49 head.

The review of the business done during the year past by the cheese and butter company showed that the institution is in a most flourishing condition. Stock is now quoted at 200 per cent of its face value, and a dividend of 10 per cent was declared upon the profits of the business for the year past. The volume is on the increase, and everything points to a prosperous season the present year.

Over \$200,000 business was done during the past year, on a paid up capital of \$5,500. At a recent meeting it was voted to raise the authorized capital from \$10,000 to \$25,000 and sell \$15,000 worth of stock, to be used in the erection and equipment of the ice and cold-storage plant.

*Colorado, Grand Valley project.*—The Sentinel is authority for the following:

There were crops raised to the amount of over \$2,000,000 last year on 15,699 acres with Government water. This water was delivered upon the lands of the owners last year for \$3.80 per acre for the season to the lands under the project and to the two districts at a flat rate per year, and is distributed by the ditch organizations.

This project is supposed to irrigate 50,000 acres, but the ditch now constructed will cover only about 30,000 acres; the rest will be supplied by pumping plants and by the extension of the ditch farther to the west. Practically one-third of the land under the present canal is now under cultivation or to be cultivated, farmers already living on the units.

The progress made the past year in settling these lands has been very satisfactory considering the conditions of the country.

Project Manager Harper, with a desire to secure information concerning successes of individual settlers and methods of farming sent out a number of questionnaires to our new settlers under the High Line. Some very interesting data were obtained, and a few are appended:

Mr. Hinshaw has the west 80 acres of the Chula Vista tract and has an unusually good bit of land. Twenty-five acres are in alfalfa, from which he harvested  $4\frac{1}{2}$  tons to the acre,  $112\frac{1}{2}$  tons worth \$2,250 or \$90 per acre.

He had 20 acres of corn, raised 1,000 bushels, 50 bushels per acre, or \$2,300; he had 22 acres of beets, which went 21 tons per acre, yielding him \$5.148, \$396 per acre; the beet tops for feed brought \$132; he had also 150 bushels of oats, 20 bushels of beans, and a few bushels of potatoes.

This is one of the best average yields of beets grown in the county the last season and we wish especially to call attention to the yield of corn, 50 bushels to the acre. It is also one of the best examples of diversified farming we have in sight but a 5-acre orchard and a few acres of wheat would have made it complete.

Mr. Kennedy has the northeast 40 of the Wallace Orchard Company tract; there are 35 acres in alfalfa, from which were harvested 175 tons of hay, or 5 tons to the acre—one of the best yields of hay reported, and it brought him \$90 per acre, \$3,150; he also had 2 acres of corn, from which he took 140 bushels, 70 bushels to the acre, and the fodder was

worth \$40; he also reports \$50 worth of garden and 75 bushels of spuds.

W. W. Russell has 35 acres of the Wallace Orchard in alfalfa, which produced 5 tons to the acre which he reported at \$100 per acre or \$3,500; he also had 8 acres of wheat, 115 bushels, \$221.95; \$50 worth of garden and also 6 acres of apples which brought \$1,072 and a half acre of peaches sold at \$650.

*Colorado, Uncompahgre Valley project.*—The western slope has been growing in importance as a potato growing territory, shipments showing large increases annually. One of the most important of the spud-growing territories over the slope is that surrounding Olathe.

According to the Olathe Criterion, the Olathe district last year shipped out 900 carloads of potatoes, and there remain probably 50 carloads yet to be shipped.

The season's beet crop is estimated to be 100 cars.

Forty carloads of onions have been shipped and there remain approximately 45 cars yet in the valley around there which are to be shipped.

The fruit crop was small last year, only 5 cars of peaches and 51 cars of apples having been shipped.

Adding these figures to the fact that Olathe was the shipping point for over \$11,000 worth of poultry, it is readily seen how important a point "The Hub" is to the wealth of the slope.

One of the best signs of the progressive spirit of the farmers of Montrose County is their eagerness for better roads. Although the county is doing everything in its power to construct modern roads in all sections of the county, the resources permit the construction each year of only so many miles of roads and their maintenance. However, the farmers have pitched in and donated sufficient to materially aid the county and at present there are many petitions before the county commissioners for the construction of roads in various sections, where the property owners are willing to give as much as half of the cost of the work.

*Idaho, Minidoka project.*—Over \$300,000 will be spent in building business houses in Rupert within the next few months. This was made certain by announcements this week of two new theaters, each to cost close to \$50,000.

Many other buildings are contemplated, included being the Masonic building and a building to be erected by Dr. Plank on lots north of the depot.

Starting a little over a month ago, with about 2,000 pounds of milk every other day, the local cheese factory has grown to such an extent that to-day it is receiving an average of over 3,000 pounds of milk daily to be made into cheese.

About 5 tons of cheese are now stored in the factory, ready for shipment, while several thousand pounds have been disposed of to local stores and patrons.

The cheese being manufactured at the Rupert factory has a luscious flavor and compares with Wisconsin's best.

*Montana, Fort Peck project.*—Poplar, Roosevelt County, Mont, is the metropolis of the Fort Peck project and Indian reservation, and naturally has many claims to distinction, one of which is truly unique. This is a commercial club or chamber of commerce where the membership is largely composed of citizen Indians.

Prof. E. J. Peacore, principal of the Indian school, Gus M. Heddrich, Alvin Warrior, and other leading Indians are back of the movement. There are between three and four hundred Indians on this reser-

vation, and they will be organized into a body which will later affiliate with the State and National organizations of commercial clubs. The organization will be nonpolitical, and it is understood will address itself particularly to the work of irrigation.

*Montana, Sun River project.*—The quest for land brought two interesting visitors to Fairfield recently. They were W. H. Baker, editor of the newspaper at Powell, Wyo., and H. Folkerson, the moving-picture proprietor there. Both came to look over the Greenfield bench with a view to buying land here, but they were somewhat handicapped in their quest by the fact that the ground was covered with snow. However, they did make a trip over the bench, and before leaving each had deals pending for purchases here. They hope to return here after a few weeks. The visitors agreed in saying that this project is fully equal to the Shoshone project of Wyoming in its possibilities, and they see a very great future for Fairfield and the Greenfield bench.

Mr. Baker stated in case he buys here he expects to come with his family and develop his holdings.

What is to the best of our knowledge the highest price paid for some time for 80 acres of land on this bench was realized in a real estate transfer made recently. H. B. Crittenden sold to I. W. Church, an attorney of Great Falls, the east 80 of his farm located just northeast of the Fairfield townsite for \$4,500 cash. Mr. Crittenden retains the west 80 on which his buildings are located, and he is planning to go extensively into the poultry business on it.

The quarter section of which the 80 was a part was homesteaded by Mr. Crittenden, and proved up on several years ago.

The price, of course, is exclusive of the Government water right, which has not yet been announced.

*Nevada, Newlands project.*—Friend Bingham of the Fallon Standard writes optimistically, as follows:

Real estate transactions, both urban and country, are livelier now than at any previous time in the history of the Newlands project and good judges are agreed that the year 1920 must witness more material progress in Nevada's only Federal irrigation enterprise than has ever occurred before in a single season. Indeed, there are those who maintain that farm land values will double during the next 12 months and that farm production will be so substantially advanced within the same period that the virtues of the Newlands project realty offerings will be very widely heralded. It is a fact that as land values mounted up year after year in other western districts, they remained approximately the same here. The absence of organized effort and the consistently maintained policy of hiding the local lights under bushel baskets had much to do with retarding legitimate development which proved very effective when combined with the ignoscible tendencies of many of our residents.

But outsiders have found us out; they have come here and sensed opportunity and with the sensing have come more people until now it must be said that the process of trade and traffic in lands has come to be fairly under way. Up in the Boise, Idaho, Government irrigation scheme, for instance, are many people who have benefited in a decided manner from high land values. They developed homes and held them until the average per acre value of farm land came to be about \$400, when many of them sold. Now it happens that the movement of a new population into that district meant a general exodus of those who sold and from this exodus the Newlands project is gaining an increasing quota of investors constantly. These men come to us with a knowledge gained of experience; they know what an assured supply of water for irrigation purposes means when coupled with a long growing season and due proximity to market.



and following the usual rule wherever rapid advances are made the new man is about to benefit in far greater proportion than many of those who have lived here for so long that their intimate knowledge of local conditions has bred unconcern and nonchalance.

It must be borne in mind that cheap land in the United States is almost a thing of the past. In California lands are sought eagerly at many times the prices prevailing here and the time is not far removed now when values here will be fairly well equalized with those in contemporaneous districts.

It is said that something like 15,000 tons of baled alfalfa remain in the several project districts awaiting sale and shipment, yet the rate at which consignments are being sent forward, if continued for long, will quickly clean out the supply. The total amount of alfalfa produced on the project this year, according to the recently completed crop census, was 93,667 tons, which at prevailing market prices means a \$2,000,000 hay crop for the season of 1919.

Forebodings that the project hay raisers were to be denied access to markets this year have been set at rest by the recent activities, for not only does the demand continue strong, but new interest in the hay possibilities here is being evidenced in sections where local hay has not yet found its way.

*New Mexico, Carlsbad project.*—Carl Smith, of Carlsbad, has purchased what is known as the "Buckner" place, in the Otis district, paying \$200 per acre for the land and improvements.

Edwin Stephenson, of the Stephenson Alfalfa Dairy, has received a registered 4-year-old Jersey bull from El Paso, Tex. The animal and crate are reported to have weighed 1,800 pounds.

Loving, 12 miles below Carlsbad, is rapidly growing into one of the promising towns of New Mexico. The bountiful season enjoyed this year by the farmers under the Carlsbad project has done much to hasten the growth of that town.

The Public Utilities Co., which distributes electric light and power over the north end of the Carlsbad project, is planning to extend its power line to Loving to provide power for the gin soon to be built. To do this the utilities company will have to expend \$10,000 on an extension of its power line from Otis to Loving and \$10,000 more in new machinery at its power dam. The extension of the power line has not been definitely decided, but most of the directors are in favor of the step.

*New Mexico-Texas, Rio Grande project.*—J. G. Stuart, a successful project farmer, tells what he did with a small band of sheep:

In June, 1918, I bought 138 head of sheep at a cost of \$1,100. The amount of cash returns from the sheep from selling wool, sheep, and pelts has been \$1,211.35.

The band now numbers 105 sheep, which I value at \$18 per head. The increase in value is due in part to the fact that the poor grade of sheep have been sold.

The per cent of increase in lambs was 115, or from 70 ewes there were 85 lambs.

Twenty-eight have died, chiefly as the result of eating young alfalfa.

The labor expense has been practically nothing.

It is beneficial to the oats and winter wheat to allow the sheep to graze over the fields as late as April. The weeds seem to not get the usual start after the sheep have eaten them off. This naturally results in a better yield of grain. Last year my wheat yielded 30 bushels to the acre, which is the average yield for this country; while the oats were surprisingly above the average, which is about 40 bushels

to the acre. The yield from my field was 70 bushels to the acre. I therefore feel that the sheep are not detrimental to the field crops when allowed to graze over them during the winter.

As an economical and effective source of fertilization of the soil a small band of sheep has no competitor.

In conclusion will say that I have one ewe in my flock that has brought six lambs in two years.

J. C. Pool, a cotton grower, of Yuma, Ariz., purchased three farms west of Anthony. The places include the James S. Brooks 105-acre farm, which is all under cultivation and sold for \$22,000, the Pete Heigel 80-acre farm, which is partially under cultivation and sold for \$8,000, the Ramon Sanchez 30-acre tract, under cultivation, which sold for \$150 an acre for the home piece of 8 acres, and \$125 for the remaining 22 acres, making a total of \$33,950 invested in the deal. The places all practically join. Mr. Pool will plow up the entire acreage and put it in cotton.

If things move right we are going to make up a two-reel scenario of the Rio Grande project this season that will run the circuit of the best audiences in the United States. Do you know why we are confident of this? Well, we have been asked by the Red Cross to secure for them the reels for their community centers and an audience of a million a month is possible. Our own bureau of visual education is now circulating 40 reels of reclamation pictures. We have nine reels abroad and in all of these the Rio Grande Valley is not forgotten. But things have moved forward a lot since 1914 and 1915 when our movies were largely taken. We want them up to date to do justice to the valley.

*Oregon, Umatilla project.*—J. M. Craik sold 40 acres of land to Thomas Haddox, of Columbia district, and 40 acres to Chevious Green, of Stanfield, the deals being closed recently through Dodd's real estate office. Both tracts are highly improved, and embraced the 80-acre ranch owned by Mr. Craik in the northeast corner of the project. He still retains his home place of 160 acres west of Columbia school, which he is going to more fully develop by putting it all in alfalfa.

H. E. Hanby has purchased the O. P. Brigham 40 acres for \$6,000. This land has all been leveled and ditched. Twenty-five acres are in alfalfa, the balance ready for seed, and one-half of the water right has been paid. Mr. Brigham still retains his home orchard tract, which is now in bearing and requires all his spare time. Mr. Hanby will completely develop his new farm by seeding it to alfalfa, at which he has become considerable of an expert. Just to show that Mr. Hanby has made good since coming to Hermiston 11 years ago we might cite that he landed here with a team and wagon and a few hundred dollars. He now owns his home place on South Hill, consisting of a fine residence and an 8-acre pear orchard. He developed 20 acres last year and sold it for \$5,000 cash.

P. B. Hayden and son have purchased the McDonald place west of town. This contains 138 acres, 20 of which is in alfalfa. It has a good house.

The Umatilla Farm Lands Co. sold 40 acres of raw land lying between the A line and the feed canal to J. H. Reid. This tract adjoins Mr. Reid's home farm. The company also sold 35 acres of raw land to C. H. McElroy adjoining his alfalfa ranch near Minnehaha school house.

The Hermiston Cooperative Creamery is stepping right along with an ever-increasing trade that puts its excellent brand of butter in the hands of satisfied customers in Pendleton, Umatilla, The Dalles, Port-

land, Arlington, and many other towns and cities in this and other States. The liberal patronage of local cream producers makes it possible for the institution to supply the large demand for its butter. This is due to the fact that small producers of cream are shown the same consideration as the large producers. Every effort is being put forth by the management to make it advantageous to the small dairymen with a limited number of cows to realize that by selling cream instead of making butter of it at home his profits will be materially greater.

The big Tillamook ranch containing 305 acres that borders on and is partly in the north and west portions of the city of Hermiston, was sold recently in two divisions for the sum of \$52,000.

C. W. Tilden, who has been managing the farm for the Tillamook interests, figures in the deal to the extent of 218 acres, having purchased all the holdings of the company situated east of the Oregon-Washington Railroad. Included in this is the residence on Ridgeway Avenue in which the Tilden family now reside. Of the 218 acres that he bought one-half is in alfalfa.

The remaining 87 acres, which lie west of the railroad track, were purchased by M. Abplanalp, of Tillamook. This acreage is also highly improved and contains a substantial residence. The new owner will continue to reside in Tillamook, having leased the tract to B. L. Beals, of this city.

*Washington, Yakima project.*—What is regarded as one of the heaviest yields recorded this season is that from the 5-acre ranch of Dr. L. F. Kuskie, of Minneapolis, on which \$9,000 worth of peaches and apples were grown during the past season.

The peach crop, from trees planted as fillers among the apple trees, totaled 7,200 boxes of Elbertas, which were sold at an average of 70 cents a box. It was estimated that, in addition to the crop harvested, at least 1,000 boxes were lost through ripening before pickers could be secured to handle them. The apple crop was approximately 2,000 boxes, and was disposed of for \$4,000. The 5-acre orchard, which is located in Huxtable's Model Orchard tract on West Nob Hill, was purchased by Dr. Kuskie in 1914 for \$1,200 an acre.

Realization that potatoes are short and that the price is not only going to be high but that it is high comes in the announcement that the Pacific Fruit & Produce Co. has closed a deal for 1,000 tons of Yakima Netted Gems, to be bought at \$65 a ton, from Benz Bros., of Toppenish. By terms of the sale the buyers take the potatoes in bulk in the warehouse, without reference to grade. The buyers will stand the shrinkage, and also furnish sacks, sort the stock, and load it for shipment.

Under the terms of the sale it is estimated that the buyers are paying about \$90 a ton for No. 1 potatoes, which is the record price ever offered in the valley. The deal was almost on a cash basis, the buyers having paid over \$35,000 when the contract was signed and promising to pay the remainder when loading is completed.

Registered beef and dairy cattle from the Yakima Valley are to be used to improve the herds which now roam about the semitropical Island of Maui, Hawaiian Territory. Thirty-five such head were bought by W. S. Clark, of Maui, who operates a 30,000-acre plantation on that island. He has a herd of 2,000 grade Aberdeen-Angus and bought the Yakima animals especially to improve the quality of his stock.

Mr. Clark, a native Hawaiian, has been in the valley for some days inspecting the Yakima stock. He picked out 14 head from the E. B. Marks's Holsteins, 14 from the Yakima herd of Congdon & Battle, and 7 Holsteins from the Carl Sprong herd at Grandview. The animals are all quality stock, the Holsteins being from the Bessie and Fobes lines of prize winners. Mr. Clark first got the idea of buying Yakima Valley cattle when he visited the Toyon Farms, in California, where there are a number of Yakima-bred animals.

*Wyoming, Shoshone project.*—Never before in its history of 11 years has the Shoshone project been on the lips of so many Americans. Throughout the length and breadth of the land the wonders of the Shoshone Valley's soil and climate have been heralded in press and pictures. Were it 100,000 acres instead of 5,000 acres which are to be available in March, every acre would be snapped up and by one who recently dropped the khaki for the civies. We've talked Shoshone and North Platte to boys who faced the Hun and chased him. We've told Shoshone's story to the lad who circled high in the heavens o'er the bloody fields of France or sailed the mine-infested waters of the North Sea, and we have wished many times that it were in our power to direct each and every one of them to a home on these favored projects.

The success so far achieved by the local storage enterprise is a splendid testimony of what the farmers and business men of this locality can accomplish when they get together. During the past year it was realized that a suitable storage was an essential necessity to the potato industry. The need being realized, a committee was organized and no time lost in pushing the plans, so that in a few months there was erected one of the most complete and modern potato storage houses in the country. The plans were drawn by a skilled engineer and architect of high standing in the profession, and the house has been built along the most modern and scientific lines.

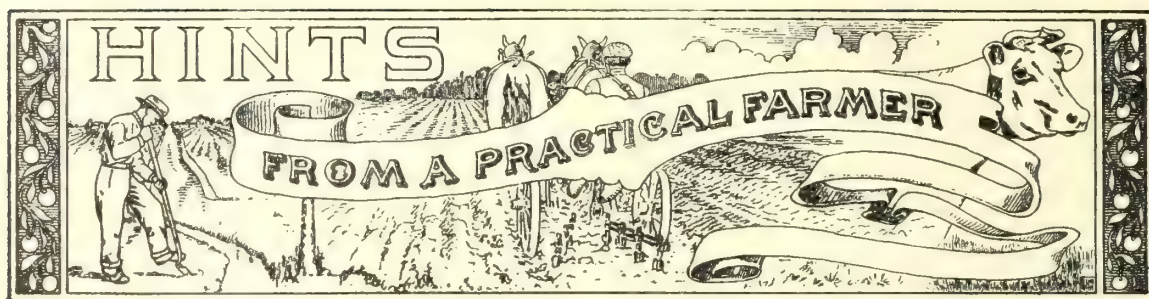
The storage is to be a community proposition, owned, controlled, and managed by local people. In order that no individual or company may have any controlling voice in the affairs of the storage company, it is planned to limit each individual to one or two shares of stock. At the present time the holdings of stock are about equally divided between farmers and business men. The board of directors will be elected annually from among the stockholders, and this board at its frequent meetings will direct the policy and management of the storage.—C. J. B.

### A CORRECTION.

In the opening paragraph of the article by Dr. J. H. Metzgerott, entitled "The Yuma Mesa reclamation auction," page 77 of the February RECLAMATION RECORD, the statement is made that Unit B will be irrigated by means of a pumping plant which will lift the water "some 200 feet." This obvious error should be corrected to read "about 70 feet."

Being a user of irrigation water under the Boise project, I am indebted to your department for the very fine monthly magazine, RECLAMATION RECORD, which comes to me regularly. I find this magazine intensely interesting and instructive, and I much appreciate it.—Alfred Phillips, Boise, Idaho.





### A Plan to Market Hogs.

Arizona has secured the man who helped to start the first cooperative hog-marketing association of California. This man is Mr. R. N. Davis, who has recently been employed by the College of Agriculture of the University of Arizona for extension work in dairying.

January's issue of the Breeders' Gazette gives a most interesting story of the first farm bureau hog market established by Mr. Davis in Kern County, Calif., at Fresno, while he was county agricultural agent at that place.

The cooperation of the packing houses was first secured. The first sales brought few buyers, but the interest in the enterprise increased. King and Tulare Counties followed Kern County, and now seven counties of the San Joaquin Valley are working together in hog marketing through what is known as a California Farm Bureau Marketing Association.

The association during its first year conducted 155 sales at which were sold 526 carloads of hogs, a total of 42,000, which brought \$1,500,000. The manager considers \$100,000 a conservative estimate of the amount received by growers above what they would have received for their hogs under the former plan. The plan permits the man with a small number of hogs to find a market. A large number of the lots of hogs assembled represented from 1 to 20 hogs per owner.

In addition to the hogs marketed, \$19,000 worth of cattle and \$3,000 worth of miscellaneous products were marketed.

With the development of farm bureaus in Arizona and with the coming of the new Arizona Packing Co. of Phoenix, it seems likely that some cooperative livestock marketing may be done in this State.

This should be a good tip for our projects.

### Blackleg Vaccine Distributed Free.

Vaccine for immunizing cattle against blackleg is still in great demand. A report of the Bureau of Animal Industry, United States Department of Agriculture, shows that 3,339,815 doses were distributed free to stock owners during the last fiscal year. The vaccine sent out by the bureau is in the powdered form.

### Garlic Flavor in Milk—How to Prevent it.

Dairymen and creamerymen in many States are troubled every spring by garlic or onion flavor in the milk. This is due to the cows feeding on garlic or wild onion, one of the first plants to start in the pasture in the spring. The trouble from garlic is not likely to last very long, as this weed is soon cropped off and the grass becomes plentiful enough for the cattle to feed on it in preference to the onion.

Garlic flavor in milk can be removed by heating the milk to 145° F. and forcing air through it at this temperature for 30 to 60 minutes. As this method requires a certain amount of equipment, it is much more satisfactory for the average dairyman to keep the odor out of milk by a few simple precautions in herd management.

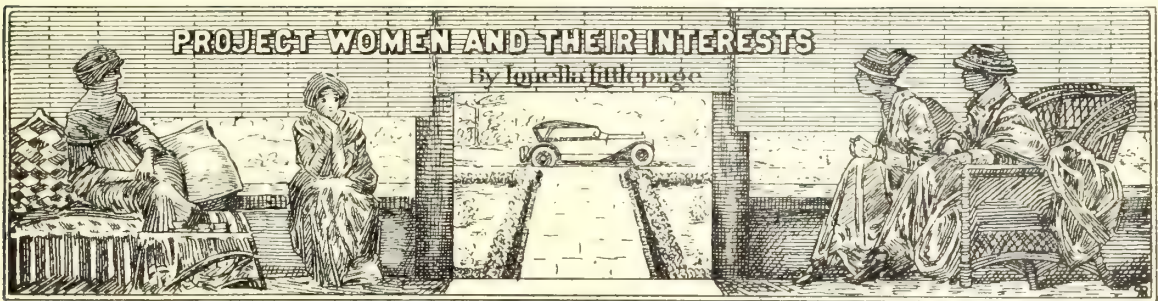
There are two ways of protecting the milk from garlic flavor. First, prevent the cows from obtaining garlic; and second, manage the herd on garlic pasture, so that there will be the least possible chance of getting the flavor in the milk.

Often the garlic is found only in one patch in the pasture, and this can be temporarily fenced off and pastured with other animals not producing milk.

Where garlic is scattered all over the field it will be impossible to keep the cows away from it, but by removing them to some other field three or four hours before each milking the flavor will be reduced to a minimum. The odor in milk is strongest from cows which have just eaten garlic, and the odor is reduced as the time between the eating of garlic and milking is increased.

In case no garlic-free pasture is available it would be advisable to drive the cattle to the barnyard three or four hours before milking, and feed them on hay and silage. As the season for garlic trouble is short this should not cause much inconvenience.

The best plan for avoiding trouble from this weed on the dairy farm is to kill it out completely. This can be done with little trouble, and those interested can obtain information on the subject by writing to the United States Department of Agriculture for Farmer's Bulletin 610, "Wild Onion, Method of Eradication."



### What is a Barbarian?

Women are strange creatures, none more so than our own enlightened "female of the species" in the U. S. A. They are horrified at the mention of Chinese foot binding, through which thousands of Chinese children have been crippled for life. They go into spasms of self-righteousness when they think of the benighted Chinese woman who tamely submits to the maiming of her baby girls; they send missionaries whose duties include the correction of such practices. Yet how many of these same women calmly accept a fashion which makes a crutch of what should be a foot covering and not only force their own feet into these ridiculous toothpick shoes but allow and even insist that their young daughters thus imperil their health.

This is not a sermon. We love to see a woman stylishly appareled. But what is style? It is the prevailing fashion, nothing more nor less, and a sensible shoe may be just as attractive as any other.



Different civilizations have evolved much the same kind of torture for women's feet.

A recent issue of Leslie's Weekly magazine had a splendid article on this subject in which it was stated that a well-known obstetrician of this country claims that at least 40 per cent of instrument childbirths are traceable to injurious footwear.

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Children, obeying their natural instinct, toe straight ahead, and are promptly taught to turn their toes outward. Yet the Indians, doubtless the world's champion walkers, set their feet one before the other as though following an invisible chalk line. An inch a step is lost in walking because of the fact that we walk with our toes turned out. Calculate the loss in time and energy if we were to walk 10 miles a day. Every girl has a horror of being knock-kneed, nevertheless most knock-knees are encouraged by high heels and toeing out. Walking is one of the best of exercises, but walking can not be beneficial if the shoes prevent proper muscular action.

Ninety-five per cent of the women in this country, experts tell us, have foot trouble in some form. We could not build a skyscraper at an angle of 45°. How can we expect the human body to properly do its work if maintained at such an angle?

Because of incorrect shoes few of our women walk gracefully; they either waddle, hobble, or teeter. The pointed-toed, high-heeled shoe causes not only minor torments such as corns and bunions, but it gives the body only two points of contact with the ground, one at the heel and the other at the bunched-up toes.

The health troubles due to improper footwear decrease economic efficiency probably on an average of 25 per cent. The American Museum of Safety claims that 95 per cent of the people in this country suffer in one form or another from foot troubles, which result in an inefficiency of from 10 to 50 per cent in each case. The museum strongly advised manufacturers who have their own interests at heart as well as those of their employees to compel employees to wear correct shoes. This has been carried out only in case of nurses and certain war workers.

What can you do about it?

What do you do when your community needs any reform? You go after it and you get it, too. There are 636 firms making women's and misses' shoes. How many women's clubs are there? The manufacturers will make anything the public demands—therefore the public must be educated to see the beauty of the normal shoe and then demand it.



### Yakima's Home Products Dinner.

By Mrs. Jean K. Gawler, Yakima, Wash.

When the Home Economics Club and the Home Economics Department of the Woman's Club of Yakima were asked by the secretary of the Commercial Club to supervise the annual Home Products dinner to be given January 7, 1920, there was little idea on the part of the ladies as to what was really before them.

The Commercial Club, which was sponsoring this dinner, was about to move into new and commodious quarters, and was naturally anxious to have the dinner "at home," but it was soon realized that several hundred would have to be turned away on account of lack of space if this were done, as probably not more than 300 could be accommodated.

Last year at the first of these home products dinners, served at the Commercial Hotel, about 500 attended. This year the club membership had nearly doubled, the State chamber of commerce would be meeting in the city and, of course, would be guests, and ladies were to be welcomed, so it was necessary that larger quarters be provided. An appeal was made to the State adjutant general for the use of the armory (loaned only for military or civic affairs), which privilege was accorded, and plans then made for serving 800.

It was with this number the Home Economics ladies found themselves confronted at the first committee meeting to make plans. This was supposed to be the absolute limit, but on the day of the dinner, so persistent was the demand for tickets, the committee sold about 150 more. To this number the working committees and paid assistants were added, making considerably over 1,000 people in the hall when dinner was announced.

It truly was a remarkable sight when all were seated. The tables were arranged with the length of the hall, with central and end aisles and 5 feet in the clear between tables to permit of safe serving. The tables were set with Japanese tablecloths and napkins, double paper plates, tin coffee cups, paraffine cider cups, paper salad plates, china serving platters for meats, and silver forks, knives, and spoons. Local florists had decorated the tables profusely with cut flowers, and they were laden with platters of beef and lamb, large baked potatoes, for which Yakima is so famous, shrimp and fruit salads, spring onions, radishes, olives, celery hearts, hot rolls and bread, strawberry preserves, large plates of Yakima "Delicious" apples, baskets of nuts grown on the outskirts of the city, plates of candy, mints, etc. When the salad course was finished the tables were cleared for the brick ice-cream, French pastry, assorted loaf cakes, coffee, Yakima cider, and cigars.

The dinner was served by the domestic science class of the high school, 6 girls to each long table, about 50 in all. One smaller table was arranged for the speak-

ers—the governor, president of the State chamber of commerce, director of the educational bureau of the State chamber of commerce (a woman), the outgoing and incoming presidents of the Yakima Commercial Club, and others. They spoke from a platform in the center rear, directly behind their table, which had been artistically decorated with flowers, palms, and flags. Vocal and instrumental music added to the pleasure. The principal speaker of the evening was ex-Mayor Hindly, of Spokane—quite a wonder.

It was found impossible to obtain enough dishes in the city. The hotels and cafeterias needed theirs, and the churches did not care to lend in this day of high cost to replace, so there was nothing to do but buy paper dishes. These were used double for the meat course, which meant 2,000, in addition to 1,000 salad plates, 1,000 ice-cream plates, and several hundred others for serving the relishes, rolls, candy, apples. For silver we had 1,000 forks, 1,000 knives, and 2,000 spoons borrowed from the Elks, Y. M. C. A., Odd Fellows, and one of the hardware stores—this, latter new, to be wrapped and returned in exact condition loaned. It required 180 tablecloths, under which newspapers were first place, entailed miles of walking to set the tables and place the food, and hours to fold the napkins. The kitchen was in the basement, half a block from the dining tables. Such kitchen as it was—a small room with no equipment, one sink, one small gas stove, and one high table in front of the sink, and most of the preparatory work and all of the serving was done from the main floor on improvised serving tables. Three extra gas ranges were installed in the kitchen on which to make the coffee, which was made in large new wash boilers, carried upstairs in the boilers, and served from pitchers to the cups already at the places.

The meat and potatoes were roasted in the ovens of one of our large bakeries, and delivered at the armory as near the dinner hour as possible. One has to be right on hand to know what it means to receive 1,000 hot baked potatoes an hour before meal-time, and try to keep them hot with four small gas ranges, the ovens of which could not accommodate even 100 of Yakima's size, and then serve them to 1,000 guests. They were brought in on huge trays, and it seemed as though they would never stop coming, and as if there was not another spot in the house where another potato could be deposited. One potato, regardless of size (and they averaged about 8 inches with very many much larger), had been allowed for each person. As no one could consume a whole one with all else provided, the result was that a large dry-goods box full was presented to the Salvation Army the next day.

Two professional meat cutters were engaged, but one failed to appear; so members of the committee (men) came to the rescue on the cutting. Their work was good, but they were too generous in their slices.

and the meat was running short. One of the exhibitors of canned meats turned over his exhibit, and there were added to the menu canned corned beef, tongue, head cheese, etc.

When it is stated that all this was accomplished by 19 ladies no one can question that serious thought and systematic planning were necessary. A chairman was elected, who appointed a committee for each detail of the work such as the following:

Committee to be at the armory at 9 a. m. to receive the articles of food, dishes, etc., and sign for same.

Committee on setting tables.

Committee on tablecloths and napkins (these with the paper plates filled a dray).

Committee on sugars, creamers, salts and peppers.

Committee on salad. (Tub of shrimp salad made by an outsider, but had to be put on lettuce by ladies. Ran short and more had to be made of canned fruit, with salad dressing donated by an exhibitor.)

Committee on coffee and coffee bags. (Later hired an expert, because of impossibility of ladies handling the large boilers.)

Committee on ice cream, 1,000 slices cut (meat cutter helped toward last).

Committee on cake, over 1,000 pieces of French pastry and loaf cakes.

Committee on trays (borrowed from a number of sources).

Committee on dish towels and soap (towels loaned by one of our laundries).

Committee on dishwashers (2 first day; 3 the second day to clear away. Took hours to wash silver alone).

Committee on serving. (Domestic science class high school.)

Unexpected duties were appearing constantly, or it might better be put that the whole thing was so much bigger than we had expected everybody had to help everywhere and quickly. Never before had we known what it meant to prepare lettuce by the crate, and green onions, radishes, and celery for a thousand people. One firm loaned paring knives, and everybody worked at these things until they were finished. Things were late in arriving, and everything in connection with the food for the dinner was done after 1 o'clock, yet the dinner was on the table on the exact minute announced for its service, 6.30.

When the guests arrived they were escorted through the center aisle to the farthest table and told to go to the farthest seat. There was no jostling, no crowding, no empty seats, and all was accomplished in a very few minutes. As soon as the people were seated the meat and potatoes and coffee were served, other things being already on the tables. Just before the speaking began there was a short intermission, through which the orchestra played, to permit the girls to clear the tables, so that the dishwashing might proceed. At 10 o'clock all was over, and everybody went home

happy, except perhaps a few who failed to get their quota of meat. Every article of food was donated, and everything grown or made in the State, most of it in the Yakima Valley, so that it was truly a HOME PRODUCTS dinner, and the whole evening was one long to be remembered by those fortunate enough to attend.

The ladies who did this big thing were only a committee from the two clubs, the membership of the two approximating 80 or more. It seems almost incredible that so few could accomplish so much, but it is a fine example of what systematized efficiency and harmonious teamwork can do. The next day was not so pleasant, when the sorting, counting, and wrapping of the silver lasted until after 5 o'clock. However, the success of the undertaking, and the appreciation of the Commercial Club and the public, made us forget the hard work after a day or two of rest, though no one, except those actually concerned, can really know the amount of nerve, muscle, and brain work involved.

Displays and demonstrations of Washington goods were made by many merchants during the Home Products Week, and prizes awarded for the best windows.

The club women of Yakima have succeeded in again having a woman food inspector appointed, and she is doing good work. The club women were responsible for the appointment of the first woman food inspector some years ago. When she resigned after making a record for herself and for the city, a half-time inspector was appointed. This proved unsatisfactory, and later she was relieved to reduce expenses, and we had none. Realizing the vital need for such inspection, the women set to work again, and finally succeeded in getting the city commission to include the item in the budget, so that on January 1, 1920, food inspection again went into force.

Now we are working for parks for Yakima. Progressive as it is in all other ways, Yakima has not even one park. A few months ago the city commission, at the urgent request of the Commercial Club, appointed a park board, which now consists of eight men and five women. This board has investigated sites, studied plans, etc., and after one refusal has succeeded in getting the consent of the commission to hold a bond election, which will probably be held in March. There is some objection on account of the high taxation, but the board is bending every effort to educate the public to the need for and advantages of playgrounds, tourist campsite, and civic center, with bandstand, etc., and to make them realize their civic duty in registering and voting. As chairman of publicity of the board the brunt of this falls on me. We had to have money before we could do any campaigning, so we gave a park board ball at the armory, and netted over \$200. The members of the park board acted as the reception committee. Francis Bushman and Beverly Bayne were playing at one of the theaters, and we invited them to come over after the play, which they did, and



both made delightful speeches in favor of parks, and urged all the people there to register and vote. They created quite an impression. We are resorting to every legitimate means to bring and to keep the subject before the people till the election is over. I keep the newspapers supplied with articles, and we may have outside speakers; we are running beautiful slides in the movies, and the club women are going to take the polling places during the election, 22 precincts, with three women in each, to save the city about \$700.

The board proclaimed the week of February 2-7 as "Registration Week." A letter has been sent to every minister in town asking him to urge his congregation to observe the week by registering.

The ladies of the board planned a "Registration Tea" in one of our largest cafés and candy shops, to which 1,200 or more invitations were to be issued, the idea being to have a social cup of tea, and then escort our guests across the street to the city clerk's office and invite them to register, a large committee of club women being available for this, taking the ladies over in small groups. Unfortunately, this has had to be postponed for a short time on account of the influenza, at the request of the health officer that no public gatherings be held.

A letter has been sent to every organization in town, about 75, and over half have already sent written resolutions indorsing the work of the board, and pledging cooperation. We expect, however, to carry the election by the vote of the women, and they are all working hard for it.—*J. K. G.*

### Christmas in Other Lands.

TIETON, WASH., *January 1, 1920.*

"This world is so full of a number of things, it seems that we all should be happy as kings"—and Tieton gets her share of the joys as well as her share of the sorrows of life.

One of the most joyful happenings of this most joyous of all seasons—the Christmas time—was the annual Christmas party given by the Tieton Mothers' Club at the home of Mrs. W. Weimar on the afternoon of December 20. The home was aglow with the spirit of Christmas that spoke through the beautiful decorations, including the lovely tree, the wide-open fire, the Christmas bells, the greens, and everything that goes to make up a real Christmasy atmosphere.

There were 40 members present and the husbands of 10 of them as escorts. The program consisted of music and reminiscences of other Christmases in other lands. The first Christmas discussed was that of "Fair Hawaii" by Mrs. Behrens, who lately came from there to make her home among us, having read of our wonderful project and the Tieton Mothers' Club in the RECLAMATION RECORD.

This instructive and well-rendered talk was followed by Victrola music—Hilo March. Then it was a

long journey we took, for we spent Christmas in Alaska with Mrs. J. A. Cadwallader. Had a real wintry day, but in the pleasant glow of the Tieton spirit, enjoyed it very much.

A most interesting part came when Horace Tapp, one of our own soldier boys, who spent a year in Siberia, told us of Christmas there. We were surprised to hear him say that Christmas in Siberia could be described in three words that were rarely ever spoken in polite society, but that it was most disgraceful and in the good old U. S. A. such "doing" would be rewarded by a jail sentence. To be brief, the main celebration consisted in getting gloriously drunk, the drunker the more glorious and the better celebration. The performance lasts for three days, and those whose constitutions withstand the debauchery till the third day are considered the best celebrators. No thought of worship or honor to the Christ Child enters into the plan. I wish that space might permit me to tell all that Mr. Tapp said, but one incident must not be foregone: "Our boys, at our Christmas season, which comes 13 days earlier than a Russian Christmas, made a real Christmas party, tree and everything, for the Russian children, and in the midst of the party they gave a dinner, and the Russians repaid the princely courtesy accorded them by our boys by stealing all the silver. Think of it!"

Then came Christmas in Norway, and I do wish there were not such a shortage of print paper that I might tell you of the sweet, happy customs prevailing there, and especially in the childhood home of Mrs. Weimar, who gave the number, but I can imagine I see her, a small, tow-headed girl, wiping the dust from her new shoes, with which, as well as all other new apparel, each member of the household must be provided at Christmas time. Then that beautiful Norwegian music, sung by Mrs. Weimar and accompanied on the piano by Miss Helen Wiemar, was not to be forgotten.

Then Mrs. J. W. Anderson described Christmas in Virginia, and we had turkey, Smithfield ham, sweet potatoes, cakes, 'n everything. She told of the Yule log, the mistletoe, the "Christmas gift" salutation, and was followed by Alma Gluck's "Carry Me Back to Old Virginny."

It has been said that "The best wine is at the last of the feast." While I can't say it was exactly that way in this case, it had certainly lost none of its flavor when Mrs. H. W. Potter told of her first Christmas on the Tieton, and as she spoke the writer looked out of the window—you know how we are when we want to suppress deep emotion—and as she looked the snow was silently and thickly falling in great feathery flakes; apparently Heaven's benediction on the lives of the brave old pioneer and her associates as she told of the efforts of the Potter family to keep Christmas in their new western home.

Many Christmases have come and gone; some were sad as last Christmas when everybody was sick and

our boys away—some in Germany, some in Siberia, some engaged in the terrible "battle" at Brest, having for Christmas feast and three times a day just slum. They were so hungry, so wet, so cold, that it did not occur to them there ever would be fire enough to warm them. Happy home Christmases were as a beautiful dream to them, and their one thought, one dream, was to get home and enjoy once more just such a Christmas as we were enjoying at Mrs. Wiemar's.

The program ended with a beautiful duet by Mrs. Potter and her friend, and then came those eats. Oh! la la!

Before going to our homes we gathered around the piano and sang to the tune of Tipperary this song composed by Mr. Waddell:

From all our homes in this good land  
We come to celebrate  
The Mothers' Christmas party,  
We won't be home till late.  
We left our husbands all at home,  
We bade them have good cheer,  
We'll bid the same to them again  
When we return from here.

CHORUS.

It's a long way to Madam Weimar's,  
It's a long way to go,  
Through the miles of what at one time  
Was the beautiful snow.  
We said good-by to all our troubles,  
Farewell to all our woes—  
Ere we started to our Christmas party  
Without any beaus.

*Mrs. Margaret Crews.*

### How Grandma Pulled the Baby Through.

A few months ago one of the well-known food magazines of the country contained an article under the above caption, written by a very versatile and capable woman of this city. The story is absolutely true and it is hoped that this brief recounting may aid some other nervous mother who does not realize the physical effect her own mental attitude has upon the delicate organism of her child.

Little Teena's young mother had always detested milk and couldn't understand how her baby could thrive on it. When a month old little Teena began throwing up her milk. The first appeal to the physician resulted in "That's all right. It's merely Nature's way of rejecting the surplus." Mother was sure he was wrong, and when the baby did not gain the doctor was again called in, this time to analyze the milk. It was found of excellent quality, but he recommended the use of barley water in conjunction with it, as it might be too rich. His directions were followed, but still the little one continued to reject most of the food swallowed and began losing weight.

Mother was convinced that baby had inherited her prejudice and could not take any food with milk in it, so she determined to try some baby food without

milk. The physician emphatically disapproved, so reluctantly cows' milk and various foods were tried, and with each failure the mother's nervousness and gloomy forebodings grew. As gently as possible the physician explained the psychological action of the mind of a mother over her child's, which in turn affects for good or ill its nervous system. The physician was dismissed and a noted child specialist was called in. He found the child perfectly normal but starved, and prescribed a different food. No use, so it was decided to send the little one to a hospital.

It was then that the grandmother, with visions of that little winsome face ever ready to smile even through tears, interfered. She insisted that instead of the hospital Teena should come to her for a time, as she felt sure she could overcome the trouble. The doctor readily consented, as it was to remove the child from the depressing effects of the mother's obsession that he had advised the hospital.

Grandmother drove her own car for Teena, and during the 4-mile ride back she talked to the dainty mite propped up in her cozy nest beside her. "You're the sweetest thing in the world," she declared, "and you want your dinner, and how good it will taste. You will love it, and my goodness how you will eat it, and you will keep it, too." When they reached home Teena was quickly installed in her new nursery, the food warmed, the grandmother entertained, telling her over and over again how good it was and how she would love it and then have a nice nap. The baby ate two-thirds of the food offered, discarded a portion, but the greater amount she retained, and was gently eased to a comfortable position where she dropped asleep.

With each feeding the same conversation was repeated with emphasis and variations, and in three days every scrap of food was taken at each feeding and retained. Soon her hunger was so far appeased that she no longer woke for a feeding in the night. At the end of the week her food was increased in quantity, and at the end of 10 days again increased, so that she was receiving the proper amount for her age.

At the end of the first week Teena had gained 10 ounces. The little mother, when told, shook her head. It was too good to be true, so grandmother insisted on keeping the baby another week. At the end of her visit on the seventeenth day she had gained 20 ounces. There had been no change in diet, and none in habit, but simply in suggestion.

And then the little mother was converted. She now realizes the value of keeping a mental attitude of optimism and good cheer, of happy, confident suggestion, which will act upon a baby in arms just as surely as cheerful conversation at the dinner table, among adults, will stimulate appetite and insure good digestion.



### Is Your Pig Insured?

One of the interesting features of pig-club work on the Orland project, California, is a system of insurance by means of which a club member may receive compensation for the death of his pig during a contest. The only provision is that he agrees to pay a proportionate share of all losses throughout the county. This insurance is receiving much favorable comment and it is believed it will do away with the worst feature of the club work, in that heretofore a member had no means of getting compensation in case of loss, and this fact frequently resulted in disappointment and discouragement among the young growers and breeders and thus defeated the very purpose of the whole club system—that of making the boys and girls successful farmers, so that they will want to stay on the farm when they grow up.

As a rule the young club members borrow money for their first pig, and it is almost a tragedy when disaster comes, as it sometimes will, sweeping away their hopes of profit and leaving them in debt besides.

Glenn County through its club work is rapidly developing a generation of scientific young farmers.

### Sugarless Desserts.

In these days of 20-cent sugar, desserts made without the precious sweetening and which are palatable are a boon to the thrifty housewife. The following have been recommended and are worth a try:

*Oatmeal and nut pudding.*—Mix 2 cups cooked oatmeal with 1 thinly sliced apple, 1 cup chopped peanuts, one-half cup currants or raisins, one-half teaspoonful cinnamon, one-eighth teaspoonful salt, and one-third cup molasses. Turn into a greased pudding dish and bake half an hour.

*Chocolate bread pudding.* Soak 3 cups bread crumbs in  $1\frac{1}{2}$  cups scalded milk. Add three-fourths cup of dark corn sirup or one-half cup corn sirup and one-fourth cup brown sugar, 1 well-beaten egg, one-half teaspoon salt, and one-half teaspoon vanilla. Melt 2 squares or ounces of chocolate over hot water, add  $1\frac{1}{2}$  cups scalded milk or hot water, stir until smooth and add gradually to crumb mixture. Turn into greased custard cups, place in pan of hot water, and bake until firm in moderate oven.

*Molasses sauce.*—Mix 1 cup molasses with  $1\frac{1}{2}$  tablespoons vinegar and 2 tablespoons fat. Blend 2 tablespoons sifted flour with 1 tablespoon cold water and add to molasses mixture. Bring to boiling point and let boil two or three minutes.

*Jelly blanc mange.*—Mix one-half cup cornstarch with one-half cup cold milk, and stir into  $1\frac{1}{2}$  cups scalded milk. Stir constantly until smooth and thick. Then continue cooking over hot water for 20 or 30 minutes. Add a pinch of salt and one-third cup apple jelly or orange marmalade. Serve with marshmallow, jelly or marmalade sauce.

*Coconut sauce.*—Mix one-half cup milk with one-half cup freshly grated or canned coconut and 2

tablespoon cornstarch blended with 2 tablespoons corn sirup. Bring to boiling point, stirring constantly, and then cook over hot water 20 or 30 minutes. Flavor with few drops vanilla, maraschino, orange, or any desired flavoring.

*Eggless, sugarless, steamed pudding.*—Mix and sift  $1\frac{1}{2}$  cups flour, one-half teaspoon soda, one-half teaspoon salt, and one-fourth teaspoon each of cinnamon, nutmeg, allspice, and cloves. Add one cup chopped raisins. Mix one-half cup molasses with one-half cup milk and  $1\frac{1}{2}$  tablespoons lard and  $1\frac{1}{2}$  tablespoons butter. Stir liquid ingredients into dry ingredients and beat thoroughly. Turn into greased molds or baking powder cans, filling them not over two-thirds full. Cover and steam for 3 hours. Serve with molasses, sauce, or cream.

*Prune pudding.*—Mix 1 tablespoon butter with one-half cup hot prune juice, one-fourth cup dark corn sirup, 3 tablespoons lemon juice, one-half teaspoon salt, and the grated rind of one-fourth lemon. Moisten one-half cup stale bread crumbs with this liquid. In a greased baking dish arrange alternate layers of moistened bread crumbs and chopped cooked prunes, using in all  $2\frac{1}{2}$  or 3 cups of prunes. Pour the liquid over this, and bake in a moderate oven 45 minutes to 1 hour.

*Bread crumb spice pudding.*—Soak 1 cup dried bread crumbs in 2 cups scalded milk. Add one-half teaspoon salt, one-half cup molasses, 1 egg, one-third teaspoon cinnamon, one-eighth teaspoon each of cloves, nutmeg, mace, ginger, and allspice, and one-third cup each of steamed prunes, raisins, and dates. It is not necessary to steam the raisins, prunes and dates more than 10 minutes. Mix thoroughly, turn into greased pudding dish and bake from 45 minutes to 1 hour.

### A Prayer.

These verses, by Florence Bone, first appeared in the London Spectator. They have been copied in several American magazines, but they are worth printing over and over until everyone knows them by heart. For, in these days of wild extravagance and unbalanced values, the one thing women can control is the dignity and simplicity of the home.

#### A PRAYER FOR A LITTLE HOME.

God send us a little home  
To come back to when we roam.  
Low walls, and fluted tiles,  
Wide windows, a view for miles.  
Red arelight and deep chairs—  
Small white beds upstairs—  
Great talks in little nooks,  
Dim colors, rows of books,  
One picture on each wall,  
Not many things at all.  
God send us a little ground,  
Tall trees standing 'round,  
Homely flowers in brown sod,  
Overhead, thy stars, O God.  
God bless, when winds blow,  
Our home and all we know.—L. L.

## GEORGE STROHM, PRACTICAL HOG RAISER.

By H. M. Schilling, Project Manager, Umatilla Project, Oreg.

Although George Strohm, of the Umatilla project, never secured a college education, he has nevertheless accomplished some results in farming and pork production that would be a credit to any agricultural institution. Mr. Strohm tackled 48 acres in sage brush in September, 1917, and to view his comfortable farm home, barn, hog lots, and alfalfa fields at the present time it hardly seems possible that one man could accomplish so much, but Mr. Strohm possesses characteristics that make for success. Intelligence, perseverance, and a keen knowledge of the hog business have enabled him to secure remarkable results.



Upper: Home of George Strohm.

Lower: Some of his prize-winning Duroc-Jersey hogs.

"Now, take the matter of feed for hogs," says Mr. Strohm. "Most people will buy feed, a sack or two at a time. Once they get bran—the mill feed—the next corn, and then something else. This, besides being uneconomical, is not good for hogs. They do better on a regular diet, or, if feed is changed it should be done gradually." Mr. Strohm buys feed in large quantities and well in advance. During the growing season he pastures his hogs on alfalfa. Water should be clean and plentiful. When fattening, self-feeders are used, but stock hogs receive grain only twice a day. Mr. Strohm says it takes between 500 and 600 pounds of grain to produce a 200-pound hog; 300 to 350 pounds for fattening, and the remaining for growth. No milk is fed; just alfalfa pasture, grain, corn, and plenty of water.

"I choose Durocs (Jersey) because they are good rustlers, hardy, and prolific. Registration has not been kept up except on the boars, which should be the best a man can get." So said Mr. Strohm with reference to breed and stock.

Thirty to forty sows are kept. Each sow should have a separate pen at farrowing time. A few weeks

before farrowing, the hogs are given a bath of crude oil to kill lice, thus acting as a protection to the young. Cleanliness prevents disease. The pigs are weaned at about 10 weeks. Hogs at about 200 pounds are marketed in from 6½ to 8 months. Sows are bred to farrow in March and the hogs marketed in the fall. Mr. Strohm markets from 3 to 4 carloads per year.

One other thing of importance should be attached to the raising of hogs and that is shelter. The grounds should be well drained and kept dry and clean. Sheds should be provided and bedding used. The sheds need not necessarily be expensive, but hogs should be able to keep warm in winter and have shade in summer. They will thrive much better.

Mr. Strohm happened to ship a carload of hogs last fall at the time of the Pacific International Stock Show in Portland and put the lot in the ring to show what porkers should look like when they went to market. He was awarded a first prize of \$250, and also received 4 cents a pound above the market price when he came to sell; thereby realizing about \$700 from the exhibition of his hogs.

Mr. Strohm is proud of his hogs, and rightly so, but he calls his hogs a side industry. Most of his ranch is in alfalfa and producing well. Situated on the uplands near the A canal, he commands a fine view of the whole project. His home is comfortable, his grounds neat and ample. His farm bespeaks of thrift and industry. The place is practically clear of encumbrance, due to the hog industry, and all accomplished in about 2 years. On the whole Mr. Strohm impresses one as a man pleased with life generally, interested in all of the phases of farming, and enjoying hog-raising as a specialty which has its financial rewards as well as being an inspiring model to the entire community.

## IDAHO STATE GRANGE INDORSES RECLAMATION SERVICE.

At the twelfth annual session of the Idaho State Grange a resolution was adopted, in part as follows:

"Whereas we have full confidence in the integrity, ability, and efficiency of the Federal Reclamation Service, based on their past work, we favor the development of all lands in this State by the Federal Reclamation Service."

Every sore throat is a danger signal and may indicate some acute, infectious disease, such as diphtheria or scarlet fever. Take no chances. Have a physician make an immediate examination. A few hours' delay may cause death.



## NORTH DAKOTA PUMPING PROJECT FARMERS DISCUSS PROBLEMS.

### A Result-Producing Get-Together Meeting.

By William S. Arthur, Project Manager.

On the Williston unit of the North Dakota pumping project the first season's work conducted under the irrigation district organization recently came to a close. The irrigation district officials knew that no year of such work could be conducted without some complaints and criticisms. They knew very well that any body of farmers who had not found themselves more or less out of harmony with the existing régime would be rare indeed. They knew, also, that methods of fixing the annual assessments for irrigation district expenses and operation and maintenance charges were not well understood. So the district officials decided to make a good opportunity to thrash out all such matters in the open, and invited all the landowners and farmers within the irrigation district to an open meeting January 28, to last practically all day.

As a rule such meetings are poorly attended, about one-third of those who should be genuinely interested coming out. Plans were made to care for 55 to 70 people. By lunch time, however, the limit had been exceeded. Ninety-six persons ate lunch and 20 to 25 additional came in for the meeting and discussions.

The time before lunch was devoted to discussions in the form of question and answer, very informally. Groups entered into lively discussions about the tables as they ate, and the everyday items of the farmers' life took on the glamour of novelty as the experienced and inexperienced, the "wets" and the "drys"—that is, the irrigation farmer and the dry-land farmer—exchanged views and experiences.

After lunch an attempt was made to follow out a prearranged program but, due to the interest and discussions, the program revised itself into the following:

11-12 a. m. Discussion of legal phases and other features of the organization of the irrigation district.

12-1. Lunch.

1-4 p. m. Report of the president of the irrigation district, covering operation policy, work done and contemplated, and receipts and expenditures, by E. Kather, president.

Farm operations 1919 with suggestion for improvements in 1920, by A. R. Barbour, superintendent of irrigation, North Dakota pumping project.

Mutual relation of the project and the creamery, by John Bruegger president Williston Creamery and Produce Company.

Status of the project, by Wm. S. Arthur, project manager.

Short talks on plans and needs of the irrigated lands, by A. R. Snook, alfalfa seed grower from Lower Yellowstone project; B. R. Harper, superintendent of irrigation, Lower Yellowstone project; U. M. Henderson, field superintendent, Great Western Sugar Co.; E. G. Scholander, better farming agent, and C. H. Ruzicks, superintendent State Experiment farm.

One division of the program, which provided for talks on intensive development, stock feeding, and building

up farm credits, was crowded out for lack of time, but these subjects were not overlooked in the discussions which came up.

Further plans for the purchasing of alfalfa seed and getting new farmers on the present large holdings were discussed.

The Williston creamery has made a splendid success the past year, and Mr. Bruegger's talk showed the wonderful opportunity that each had in being helpful to the other. The increased alfalfa acreage in the district will mean feed for more dairy cows to supply the creamery, and the creamery means a ready market for the alfalfa when marketed in the profitable form of butter fat. The creamery's profit was \$11,000 last year and a patronage dividend of 11 per cent was paid to farmers furnishing butter fat.

The project manager reviewed the status of the project, setting forth the concessions made by the Secretary in approving the terms of the new contract, and dwelt particularly upon the need of the district's meeting the first payment, which will be due to the United States on March 1.

It can be said that every question was squarely answered. The meeting as a whole was planned to give every man and woman in the district an opportunity to free his mind, to acquaint each with the work done, the cost of doing it, the items for which the district had spent the money collected, and the probable expenditures of the near future. Visitors from Montana and outlying sections congratulated the project farmers on the "good thing you have here," saying that costs were less and prospects brighter than in some of the older irrigated sections.

On the whole, it is believed the meeting proved to be of decided value to the farmers, the irrigation district officers, and the Reclamation Service men, and showed how apparently great difficulties shrink when squarely approached in a cooperative effort. It is hoped that the regular irrigation district meetings will be more along this line in the future. At least, more public meetings will be held.

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For the inclosed money order, amounting to 50 cents, please mail RECLAMATION RECORD for one year to the above address. I am greatly impressed by the data one may obtain from the publication. It should not be overlooked by any person desiring better farming and a knowledge of the good work the Government is doing in reclaiming arid lands.—*Arthur O. Olson, 219 Twenty-third Avenue NE, Minneapolis, Minn.*

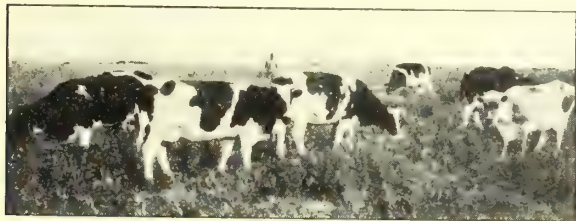
## COTTON AND LIVE STOCK ON THE SOUTHWESTERN PROJECTS.

EDITOR, RECLAMATION RECORD:

I would like to offer, through your columns, some observations for the consideration of your readers on the Salt River and Yuma projects. On these two projects the production of cotton has come to be the largest crop industry. On the Salt River, cotton occupied fully 25 per cent of the cropped acreage last year, while on the Yuma something like 40 per cent of the land was used for this crop. At the prices ruling during the market season now closing, the cotton crop has been profitable, and the present indications point to an increased cotton acreage for the coming season.

This, of course, is a gratifying situation to those who have advocated cotton, particularly long staple cotton, as a crop for these projects. But there are some features of this situation that are rather disturbing when one looks a little ahead. As one of those who was identified with the early work of establishing the cotton industry on these projects, I feel that it may not be improper to call attention to the relation of this to other local agricultural industries.

In the Salt River Valley, particularly, the live-stock industries of dairying and beef production have long been of the first importance. These industries, based on the alfalfa crop, have been the backbone of the financial stability of the valley, and the accumulated fertility from years of live-stock farming has contributed largely to the bountiful crops of cotton which have been produced in the past few years.



Much of the land in the Salt River Valley may be expected, one year with another, to give better returns through high-producing dairy stock than from any other industry.

There are, of course, some of the new lands in both the Salt River and Yuma Valleys on which most excellent crops of cotton can be produced for several years. But on much of the land in both valleys cotton must follow alfalfa if large yields are to be secured. And it is altogether advisable for the Arizona cotton grower to plan a system of farming which will make large yields possible, for price levels in the future may be such that only through large yields can profitable production be secured.

The most immediate cause for apprehension is not, however, due to an anticipated decline in yield. It is due rather to a fear that enthusiasm for the possible

profits of cotton production may jeopardize the future of the live-stock industries that have been and should continue to be the basic industries of these valleys. It was not so many months ago, less than two years, in fact, that there were some 55,000 head of dairy cattle in the Salt River Valley, with probably nearly half that number of beef cattle fed or fattened annually. These animals utilized most of the alfalfa produced on 150,000 acres of land, and both directly and indirectly contributed an enormous aggregate to the prosperity of the valley. It has been noted recently that owing to the interest in cotton production the dairy herds have been broken up and sold out of the valley at bargain prices, until the number of dairy cows now in the valley is said to be not more than 15,000. The hay and pasture for beef cattle have also become harder to secure, and the number of these animals has been likewise reduced.

In the Yuma Valley a similar situation exists, though in this case the live-stock industries have been relatively less important.

It is not the purpose of these observations to discourage cotton production, particularly in the face of the present active demand for that crop and the existing prices, but there is clearly a danger that the cotton acreage may be extended beyond the limits of safe farming. It can scarcely be questioned that in both the Yuma and Salt River Valleys at least half the irrigated acreage should be kept in alfalfa, and the resultant crop should be utilized locally with live stock. And there should be land available for grain crops and other minor crops. There appears to be some danger that the present enthusiasm for cotton may result in reducing the alfalfa acreage and live-stock population to a point where the economic balance is upset. It is not difficult, of course, to reestablish alfalfa, but it takes time and money to reestablish profitable live-stock industries. These are complex organisms involving skilled and dependable workmen, elaborate manufacturing plants, and market outlets that can not be created quickly.

Would it not be well for the farmers and other responsible leaders in these communities to take stock of this situation and discount, as far as possible, the readjustment that changed conditions may make necessary?

C. S. SCOFIELD,  
*Agriculturist in Charge,*  
*Office of Western Irrigation Agriculture,*  
*United States Department of Agriculture.*

This is the scarlet fever season. A clean, sanitary mouth will help prevent it. Compel the children to brush their teeth regularly and keep the mouth clean.



## THE ROMANCE OF A RIVER.

### A Past, Present, and Future Survey of Irrigation in Southern Idaho.

By E. B. Darlington, Chief Engineer, Twin Falls North Side Land & Water Co.

We are to-day at a period in Idaho's history where we can indulge in both a review of the past and a vision of the future. Fifty years ago Snake River ran uninterrupted to the sea. To-day over half its waters are diverted to the use of man. To-morrow we expect to see a complete utilization of this magnificent stream from Jackson Lake to Milner Dam.

SNAKE RIVER and its tributaries are the arteries which carry the lifeblood of southern Idaho. The mighty torrents sent down from the Tetons, the Sawtooth Mountains, and the Owyhees vitalize 2,000,000 acres of our sun-kissed plains. Before many years have passed another million acres will be reclaimed from the desert and added to this emerald empire.

SNAKE RIVER Valley stretches entirely across southern Idaho from Yellowstone Park to the Oregon line, a distance of about 400 miles. Its valley is the broad and irregular segment of a circle, with a radius of over 150 miles, the concave side to the north. The width ranges from 50 to 125 miles, embracing the delta cones of a number of lesser streams which bring their waters to the Snake.

About 110 years ago the first white men came into the Snake River Valley. They were fur traders. One of the first camps established was near the present site of St. Anthony. Another party entered Idaho by way of the beautiful valley of the Teton. Upon reaching Snake River, which at that point was placid and inviting, they embarked upon its broad bosom in canoes, not realizing the latent furies in the sparkling water. This first attempt of white men to put to their own uses the untamed Snake was disastrous. After many hazardous experiences they reached the wild waters where now stands the Milner Dam. There one of the canoes was wrecked and some of the party drowned, and travel by boat was abandoned.

It was not until 70 years later that the great river began to yield her beneficence to man. Pioneers from Utah about that time began to settle along its banks and upon its tributaries. In the Mormon colonies they had learned how to make use of the life-giving water of the streams by spreading it over the thirsty soil. Nature's moisture deficiency was thus supplied and bountiful crops were the result. Of course the lines of least resistance were followed first. The earliest ditches were built by individuals. What a signal event it must have been in those early days to herald the first water from the river as it came down the newly constructed ditch upon some little farm carved out of the wilderness! Perhaps only those of us later comers who have camped upon the desert and waited long hours for the arrival of the water wagon can appreciate the thrill there must have been in the hearts of those early families when the water first appeared.

As the land that could be served by individual ditches became occupied, small cooperative associations were formed for building ditches on a somewhat larger scale and to cover lands a little farther back from the river. These community ditches were not always successful. Operation of them sometimes worked out so that the man at the upper end got all the water and the man at the lower end all the upkeep. The next step was the organization of corporations to construct more pretentious works and to sell or rent water to the farmers under them. Dissatisfaction developed with this arrangement, as it was felt that the use of water was such a vital necessity there was danger in placing its control in the hands of interested officials. Most of these properties have been taken over by irrigation districts, by which form of organization the water users themselves own and control the irrigation system and water supply.

It was at about this stage of development that far-seeing engineers and other men of vision, such as Foote, Wiley, Ross, Perrine, and others, began to conceive the possibilities of redeeming vast areas upon the higher benches by means of monumental diversion works and far-reaching distributaries many miles in length. Great dams were to serve as ladders by which the waters would climb to the mesas and there be diverted into canals, themselves resembling river channels in size and capacity. Projects of such magnitude could only be undertaken under the protection of legislation safeguarding the investment of enormous amounts of capital. In 1894 the Carey Act was passed, but there was very little construction under it until after the amendments in 1896 and 1901, providing that the cost of the works should be a lien upon the land. From 1901 to 1910 was the period of greatest activity under the Carey Act, and during that period practically all the great projects in Idaho were built. In 1902 the reclamation act was passed, and shortly afterwards work was undertaken on the Minidoka project and the Boise project. The development of these great projects has been remarkable. Their agricultural production has been phenomenal. A short time ago reports were made public showing that the value of the crops produced on the Minidoka project during 1919 exceeded the entire cost of the works. The North and South Side Twin Falls enterprises are also wonderfully prosperous.

The visions of the early seers have been far surpassed. What seemed to many of their contemporaries to be impracticable dreams have been more than realized. Their splendid plans and designs have met every test. Aesthetic critics sometimes profess to believe that engineering works are a profanation of nature and a blasphemy upon the Almighty's scheme of things. How little is this view founded in the truth!

Is it not a better concept of these men of great vision and master designers to regard them as understudies of the Creator, delegated to bring forth upon the earth a better condition of life, a finer spirit of contentment, a higher state of development, and an advancement in human progress?

Thus has been brought about the wonderful reclamation that is now so manifest. Thus have been brought into use the latent agricultural resources of this great valley. What a wonderful experience it has been to watch the marvelous development by irrigation in the last 20 years. We who have been privileged to take a part in this development have rejoiced many times that we were engaged on a task that carried with it such inspiration and that produced such conspicuous results. Those of us who have dwelt for months in the sagebrush, who have worked long hours into the night with the weird wail of the coyote in our ears and the wind whipping our tents to shreds, who have baked in the sun, chilled in the blizzard, and choked in the dust, can now take keenest delight in the fair fields of alfalfa, the waving grain, the splendid buildings, the thriving stock, and the canals flowing full where once our lines of stakes were driven.

But what does the future hold in store for the Snake River Valley? We do not propose now to rest on our oars. The time is ripe for broader and greater visions and for harder and better efforts. We must join hands to procure the maximum use of the great river. Every year several million acre-feet run unused to the ocean. This water must be impounded and conserved for use at the time of greatest requirement. We must use the budget system with our waters as with our finances. Already there has been brought about practically full utilization of Boise River, Salmon River, Wood River, Blackfoot River, and Goose Creek by means of storage reservoirs created by splendid dams, and others are in course of construction. The great Jackson Lake Reservoir stores all the water behind its dam that is there available, but numerous torrential tributaries bring in great volumes of water farther down the river. Fortunately there are other splendid reservoir sites on Snake River which offer storage facilities at reasonable cost. The most outstanding of these is the American Falls site. At this one location the greater part of the excess flow of the river can be impounded. Let us visualize the consequences of making this surplus water available for irrigation.

In the first place perhaps a million acres of highly improved land may be added to the taxable wealth of the State. This means, or should mean, more money to be expended for public improvements or a lower tax rate, either of which everybody will welcome. Our horoscope shows a broad and well-populated area stretching from the Tetons to the Blue Mountains, checkered with intensively cultivated farms and splendid stock ranches. The Snake River Valley is destined to become the greatest seed-producing terri-

tory of the world, and is now fast becoming a splendid dairy and stock-producing country. Increase in population brings with it better social, educational and civic advantages. Who doubts that in a very few years there would be a university and an agricultural college in the Snake River Valley?

There will be better transportation facilities and therefore better markets; great industrial plants, such as sugar factories, cheese factories, creameries, ice plants, dehydrating plants, flour mills, alfalfa meal mills, canning factories, great elevators and ware-houses. Numerous cities and towns will spring up, with attendant business facilities. Train-loads of cattle, sheep, wool and farm produce will roll out, and financial returns will roll in. Banks on the North Side project in this year of serious shortage of water supply show an increase in deposits of nearly 50 per cent. Banks in the Minidoka project hold deposits of \$4,000,000. This is the trend all along the line. Everywhere there are signs of prosperity.

New development can not be undertaken recklessly, however. We have won through to our present status in spite of many serious mistakes that have been made in the past. These will be warning signs for danger in the future.

There must be a better settlement plan than we have had heretofore. The conquest of new land is a bigger and harder proposition than we have realized. Men without adequate capital to finance their farming operations must have long-time credits at moderate rates of interest. They should have the opportunity to provide themselves with comfortable homes, good livestock and the right kind of equipment. Many new settlers need expert advice. Plans are being formulated on the North Side Twin Falls project to inaugurate a department of farm engineering, to furnish building plans, lay out service ditches, locate tap boxes and weirs, plan field lay-outs, experiment as to the best spacing of catch ditches and corrugations, make soil tests, plan rotation schedules and render every reasonable service to help get the new man satisfactory established, and to eliminate for him so far as possible the problems which in the past have only been solved after years of experience.

There is a song with the line "If the waters could speak as they roll along" that seems applicable to the Snake River. The waters of this Nile of the West would, indeed, speak of marvelous things—of great adventures and great accomplishments, of tragedy sometimes, but more often of happiness and prosperity—sometimes of tremendous damage done and again of great wealth produced. The potentialities either way are almost beyond imagination.

As citizens of the Snake River Valley, we have a great duty upon us—to see that this romantic river is an agency only of beneficence and that in the development of its full utilization these incalculable benefits shall be for the greatest good of the greatest number.



## DUTY OF WATER IN IRRIGATION.<sup>1</sup>

By W. L. Powers, Chief in Soils, Oregon Agricultural College Experiment Station, Corvallis, Oreg.

Duty of water is perhaps the broadest problem with which irrigationists have to deal. As large projects develop, values increase, and more intensive methods become necessary, the demand for definite evidence as to the amount of water needed for crops and soils becomes more urgent. If the highest productive values are to be reached and the greatest production of the best quality of crops is to be maintained, large projects require more efficient use of water. Duty of water data are of value in the equitable apportionment of public water supplies, in the determination and settlement of water rights, in the determination of capacity for irrigation structures, in the prevention of waste and utilization of water resources, and in the control of soil moisture in such a manner as to produce the maximum net profit from agricultural operation. Considerable difference of opinion exists as to the proper duty.

A reasonable amount of water needs to be provided for each of the chief soil types and for each important class of crops according to their water requirements, average yields, and relative acreage on each project. This is desirable rather than to lump one flat rate for a great valley or project. The amount of water provided affects estimates and final cost, determines the area it is possible to irrigate, and has its effect upon the security of investment in irrigation and the ultimate agricultural and financial success of a project. Without control and economic use of the water resources, the fullest development and highest values will never be realized in the irrigation sections. To secure economical use of water on an irrigation project and avoid alkali and drainage problems, there must be a good distribution system and each farmer must use water intelligently.

Too little water results in crop shortage, while excessive irrigation may lessen the crop and injure the soil in places to the point of unprofitable production. It is better economy to provide only a moderate allowance of water with reasonably priced structures than to provide a liberal supply at a great expense and invite additional drainage assessments later on. The aim should be to get the highest practicable efficiency out of every acre-inch of rainfall and every supplementary inch of irrigation water provided. The amount of water that will give the greatest net profit an acre will generally represent the limit of preventable loss under present economic conditions in Oregon. As water becomes very valuable in places the net profit to the acre-foot will become of increasing importance.

In a discussion of duty of water in irrigation it is necessary to define terms and standards.

The *duty of water* is the relation between a given quantity of water and the area which it serves. For purposes of this article this relation will be expressed primarily as the number of acre-inches used to the acre. Where a few acre-inches are used an acre, the duty is said to be high, and where many acre-inches an acre are used the duty is called low.

*Economic duty* as used herein refers to the quantity of water giving the maximum net profit an acre, all costs, such as land, water, cost of production, and crop value, considered. Where water is very valuable, and scarce in proportion to the irrigable acreage, the quantity required for the maximum net profit will be little more than that required to give the greatest returns an acre-inch. Where land areas are valuable or limited the maximum net profit an acre will be realized by using almost as much water as would be required to produce the maximum yield an acre. The quantity giving the maximum profit an acre may be greater than the amount required for the maximum return an acre-inch and less than that required for the maximum yield an acre; but, like these other factors, it will be subject to the law of diminishing returns as greater quantities of water are applied per unit of land.

*Water requirement*, or *water cost of dry matter*, or *evaporation transpiration*, or *absolute duty* refers to the number of units or pounds of water passing through a plant, plus those lost by evaporation from the soil belonging to the plant, for each unit of dry matter produced, unavoidable percolation and subbing in the fields being disregarded. Expressing the quantity of water as the number of pounds required to produce 1 pound of dry matter gives an exact measure of the water consumed by the crop. The water cost under field conditions obtained in connection with those plots giving the maximum net profit an acre over several years of time gives us a fairly reliable figure for the crop-producing power of water and for estimating the highest probable duty of water.

*Irrigation requirement* refers to the portion of the total water used by the crop which will need to be furnished by irrigation. To obtain the economic duty or irrigation requirement under the condition as herein determined and presented, the number of inches of water associated with the plot giving the maximum net profit each year has been averaged.

*Highest probable duty*, or *crop producing power of water*, based on the water cost, is used to refer to the least probable amount actually required to be consumed by plants from soil, rain, and irrigation for most profitable yields under modern methods of farming as determined by several years of experiments. In sections where rain and soil water are practically negligible in quantity, this figure should indicate the

<sup>1</sup> From Experiment Station Bulletin 161.

least probable amount of irrigation per unit production. In other words, if it requires 6 inches of water to produce a ton of alfalfa hay containing 15 per cent moisture, the duty in an arid section where a good yield is 3 tons an acre is not likely to be less than 18 acre-inches an acre for the season, or where the yield is 6 tons an acre it is not likely to be less than 36 acre-inches an acre for the season.

#### FACTORS AFFECTING ECONOMICAL USE AND DUTY OF IRRIGATION WATER.

1. *The kind of ditches or distributaries*, both large and small, affects the amount of water used. In a new country of moderate land values, earth and a little lumber may be all that the pioneer is justified in using while he is bringing the land into profitable production. In the following decades, when large productive values are established and water becomes more valuable, more permanent and impervious structures are justified. Under general farm conditions at present, perhaps 10 to 20 per cent of waste within the farm unit is allowable.

2. *Careful preparation of land* by thoroughly leveling to one or more planes will save time, money, and water later on. Careful leveling should be done before seeding down permanent crops.

3. *The method of applying water* affects the water requirement. The head and length of runs should be such that the plot irrigated can be covered by the time the irrigation has wet up the root zone. A high head forces rapidly over the land, and is necessary in flood irrigation or in irrigating loose soils. A longer length of run gives more time for soaking during irrigation on the heavier-textured soils. Longer runs can be used on more sloping land, and shorter runs with a higher head should be used on the flatter lands in order to cover the land without waste. In many valleys the flooding system could be improved by the introduction or extension of a strip-border method in flooding. On the small farm and with a small head the furrow system will save water better than the flooding system.

4. *Climate*, of course, affects duty of water in different regions; for irrigation is supplementary to rainfall, and the greater the rainfall during or just before the growing season, the smaller is the irrigation requirement.

5. *Altitude* is related to climate. With loam soil of Eastern Oregon, if about 3 feet is needed up to 2,000 feet elevation, 2 feet is reasonable at about 3,000 feet, and 1½ feet for elevations above 4,000 feet.

6. *Soil texture* affects irrigation requirements. The coarser soils require more water, and these soils generally have a low water capacity, and a comparatively low amount of surface area, pore space, and organic matter, and are apt to be medium in fertility. The light, frequent irrigations required on these soils involve more or less waste. On the coarse sand area

on the Hermiston Project in 1916 with careful distribution of the water 13 acre-feet an acre was used, whereas on the fine textured soils in the same district 2 or 3 acre-feet was sufficient. The texture and structure of the subsoil and the depth of soil are of course very important, for they affect the usable water capacity of the soil.

7. *The kind and variety of crops* affect greatly the duty of water. Alfalfa and other meadow crops require relatively large amounts of water, grain and field peas a medium amount, and cultivated crops such as potatoes still less. If low water cost of dry matter is to be secured it is necessary to use the best varieties of staple crops, and to have a perfect stand in proportion to fertility of the land. Modern irrigation agriculture contemplates the use of well-bred domesticated plants. About two-fifths of the irrigated land in Oregon is wild, flooded native meadow. Perhaps 3 to 4 acre-feet an acre is used on these meadows, and the average yield is three-fourths of a ton of wild hay. This hay is rather high in crude fiber and low in digestibility. We have thoroughly demonstrated that on these same lands with partial control of the water it is entirely possible and feasible to produce under field conditions from 2 to 3 tons of alsike and timothy hay by using from 1 to 2 acre-feet of water to the acre; and we believe that it is practicable to realize thereby a greater net profit.

8. *The average yield* under good modern methods of farming affects the quantity of water needed to be consumed.

9. *The kinds and amount of cultivation* affect greatly the irrigation requirements, and dry-farming methods should not be overlooked on the irrigated farm. A good portion of the farm should be in crops that will permit cultivation and maintain an ideal soil mulch, and this area should be remulched just as soon after irrigation as the soil is dry enough to crumble. In many sections fall plowing with more use of winter grain will lessen the amount of irrigation needed.

10. *The method of the delivery* affects the use of water. The delivery methods should be made to conform as nearly as possible to the plant needs. Distributaries should be of a capacity to provide a proper head, and as far as possible the farmer should be allowed to receive his allowance as needed. It is desirable to practice a rotation in the use of water and get a high head that will permit an even and rapid distribution while the water is on the farm. A higher duty may also be obtained where the irrigator pays at least maintenance charge in proportion to the actual amount of water used, for this is wise economy.

11. *Skill and economy* of the irrigator are important factors affecting the economical use of irrigation water. Careless use of irrigation water results in a great loss, whereas skillful management will almost wholly prevent loss. During irrigation, the irrigation farmer is worth more in manipulating his irrigation



and watching it than he is in any other work he might be doing on the farm. He is needed for setting the water, which requires several hours time to distribute itself.

12. *The time of irrigation* affects greatly the efficiency of the water applied. Irrigation, like cultivation, is worth more when applied at just the right time. In experiments at the Corvallis station irrigation was applied according to the moisture content of the soil and the different degrees of dryness. It was found that on the potato plots as much as 50 bushels an acre more could be secured by applying water just at the right time, which for our own brown silt loam soil was when the moisture content dropped to the 20 per cent point. Clover was found to give the best returns on this soil when the moisture content of the first 2 feet had dropped to the 14 per cent point. These figures held for both wet and dry years.

13. *The amount applied each irrigation* will affect the economical use of irrigation water or irrigation requirements. If the amount applied is in excess of the capacity of the soil strata within the reach of the roots to retain it, deep percolation loss results. This has been one of the chief sources of waste encountered in our investigations. Coarse-textured soils or those with gravelly substrata should have a distribution system that will permit of a comparatively light and frequent application which can be retained in the soil without percolation loss. The amount the soil will retain should be determined or estimated and a head of water turned on sufficient so that the water reservoir to the depth of the root zone will be replenished by the time the entire surface is covered. The amount of irrigation should not exceed the estimated acre-inches needed on the land. Proper distributaries and short runs make it possible to spread a light irrigation with considerable uniformity.

14. *Soil fertility* is one of the most important factors affecting irrigation requirements. Where there is a good supply of available plant food, the plant does not have to exert nearly as much energy in growth or to use as much water to secure the nourishment required to form a pound of dry matter. Frequently in our experiments application of a simple fertilizer has saved from a quarter to a half of the total irrigation and has doubled the returns from each unit of water. This is especially true on the lighter types of soil. For example, on the Redmond Demonstration Farm in 1912, \$4 worth of potash as potassium sulphate was applied to an acre of potatoes. This and an adjoining untreated acre received 6 inches depth of irrigation for the season. The yield of the fertilized plot was 235 bushels or 39.1 bushels an acre-inch, while the unfertilized plot yielded 145 bushels or 24 bushels an acre-inch. Also in the Goose Lake Valley, \$2 worth of sulphur an acre increased the yield from  $1\frac{1}{2}$  to 3 tons an acre and secured a return of 1 ton an acre-foot as against one-half ton an acre-foot unfertilized. A greater net profit

and a lower water cost were secured in each case on the treated plot. Manure experiments at Corvallis show a yield of one-fourth more to the unit of water. One ton of manure may equal 100 tons of water in securing returns.

15. *Crop rotations* are more important to the irrigation farmer than to the rainfall farmer. With irrigation the crops removed are generally large, and large amounts of refuse must be returned to the land; it is entirely feasible to build up and keep up the soil to the highest state of fertility. Rotation of crops permits plowing up the meadows and marketing the nitrogen accumulated by the legume crops, while the plowing increases usable water capacity and the humus both increases the water capacity and liberates plant food.

On the Oregon Experiment Station plots, we are closing a second four-year rotation and joining our other plots that have been continually in meadow. Water-cost data obtained show a decrease in cost of about one-fourth in favor of the proper irrigated rotations. The water cost has decreased with rotated dry plots or check plots as compared to the continuously cropped plots. In the arid sections we have initiated more recently similar experiments which promise even more marked results.

16. *Crop diversity*.—A diversity of crops, including some cultivated cash crops which use but little water, generally gives larger cash returns to the unit of water. Such a plan also involves distribution in the use of water on irrigated farms, whereas in the one-crop country all the lands are demanding water at one time.

17. *Water cost of dry matter* is an important basis in determination of duty of water wherever it can be determined for the chief crops as an average of tests continuing through several years. Different investigators have found that the crop-producing power of water, or water cost, varies somewhat with climate, season, crop, soil structure and texture, cultivation, soil fertility, amount and time of irrigation, crop rotation, and stand of crop. Under good modern methods of farming, however, the water cost for a good silt loam soil has been reasonably uniform for representative trials. The seasonal variation with plots receiving proper irrigation at Corvallis has shown a range of about 15 per cent. The water cost is regarded as of considerable value in duty of water work and its value should increase as data accumulate.

18. *Dollars cost*.—In working out a reasonable duty of water, we must take into consideration the value of land, water, labor, and crops in the district. At present, in the Northwest, the largest profit an acre is perhaps the best basis for judging economical use of water. The largest profit is secured with somewhat less water than would be used to secure a maximum yield an acre and somewhat more than the amount needed to give the maximum yield an acre-inch. As water and other things become very valuable the

greatest profit an acre will be obtained with little more than needed to produce the greatest profit an acre-inch.

The amount of irrigation required will vary somewhat with the season, and anything which affects the evaporation, percolation, or transpiration of soil moisture will have an effect upon the irrigation requirement. Anything, in fact, that constitutes good farming tends toward economical use of irrigation water.

Proper economical irrigation is necessary to permanent irrigation agriculture. Irrigation should provide a favorable moisture content and should aid in the liberation of plant food and its solution in the plant. It should also increase the bacterial activity as well as the root and top development of the plant. The effect of increasing root development will be to offset any running together of the soil by irrigation. Wise irrigation will insure larger yields and greater net profits without injury to the quality of the produce. It is fundamentally important in irrigation farming to practice a careful rotation of crops that will permit growing clover or some other soil-building crop every few years and frequent deep plowing so as to maintain a good state of tilth and humus content. A good proportion of cultivated crops should be grown each year. Such crops require less water. The use of clover and other soil-building crops, together with the application of manure, maintains the water-holding capacity and fertility, maintains and builds up the soil, and lowers the water cost of dry matter. Where irrigation is practiced, larger amounts of manure can be used without making the soil too open. By irrigation farming free working soil can be built up and kept in a high state of fertility and productivity. Irrigation farming reaches its highest development in connection with intensive farming. The highest values are realized in sections where water is valuable and most economically used.

Irrigation will become of increasing importance in the West on most of the free working soils in connection with intensive agriculture.

If we can save 50 per cent of the water used in many places, we can practically double the crop-producing area. Furthering the economical use of water will, therefore, help to establish highest productive values and add permanently to the food output and wealth-producing area.

The problem of economic duty of water is admittedly complex, but all the agricultural wealth developed and undeveloped in the arid West will be favorably affected by its proper determination. The cost of investigations would be returned manyfold by security gained from water litigation. We must plan with the future in mind, each decade being provided with a duty or allowance according to the times. The great principle of beneficial use will permit us to make adjustments for each decade according to economic and other conditions, and provide a practical economic duty of water.

## COMPARATIVE COSTS OF CONCRETE LINING, ORLAND PROJECT, CALIFORNIA.

By A. N. Burch, Project Manager.

A paper published in the RECLAMATION RECORD of April, 1916, described the work of concrete lining on the Orland project up to February, 1916, with a cost analysis of the work.

Because of the demonstrated saving in maintenance costs, as well as in water losses, the water users of the project entered into a contract with the Secretary of the Interior in the spring of 1918 to line practically the whole distribution system. This work involves 650,000 square yards (25,500 cubic yards) of concrete and covers about 70 miles of canals and laterals.

The work of necessity will be done between irrigation seasons, which will give a period of about 120 working days out of each 12 months.

This work was commenced in the fall of 1918 and is being pursued under limitations as to labor and funds. The methods in use are substantially the same as those described in the paper mentioned above, and the object of this paper is particularly to compare and analyze costs under the changed conditions now existing. For this purpose the following tables are submitted, itemizing and giving unit costs for the period previous to the fall of 1918, for the season of 1918-19 and for the first half of the season 1919-20:

	Prior to 1918.	1918-19.	1919-20.
Cement.....	\$0.0977	\$0.1200	\$0.1260
Sand and gravel.....	.0424	.0535	.0643
Labor, preparing canal.....	.0691	.0738	.0853
Labor, mixing.....	.0301	.0392	.0293
Labor, placing.....	.0307	.0413	.0564
Labor, sprinkling.....	.0043	.0052	.0013
Engineering and supervision.....	.0292	.0230	.0259
Equipment maintenance.....	.0074	.0062	.0088
General expense.....	.0438	.0272	.0311
Total per square yard.....	.3547	.3894	.4284
Quantity, square yards.....	267,320	57,880	30,000

Based on 100 as representing costs prior to 1918 the following statement shows the relative cost of the principal items entering into the work:

	Prior to 1918.	1918-19	1919-20
Materials.....	100	124	136
Labor.....	100	119	135
Superintendence and engineering.....	100	80	89
Equipment maintenance.....	100	81	120
General expense.....	100	64	70
Square yard.....	100	110	121
Wages, laborers.....	100	146	160
Wages, clerical, engineering, etc.....	100	120	135

It will be noted that the increased cost of the labor and materials entering into the finished work is 35 per cent, and that the increased cost per unit of work



is 21 per cent, while the wages paid to labor in 1919 were 60 per cent and to clerical and engineering 35 per cent greater than for the period before 1918.

There was a decrease in unit cost in engineering and supervision and general expense, amounting to 11 per cent and 30 per cent, respectively, as referred to the earlier period, and to 51 per cent and 32 per cent, as referred to the 1919 work. The relative economy of 1919 results is due in a small measure to these last two items but in greater measure to better or-

ganization, most careful coordination of the different operations involved, and unremitting attention to details.

Individually the average laborers now employed do not render as efficient service as was given during the earlier periods of the work. The labor turnover amounts to about 20 per cent per month, and with the exception of some of the old employees and skilled laborers services are more or less indifferent and perfunctory.

## USE OF WATER ON RECLAMATION SERVICE PROJECTS.

By E. A. Moritz, Engineer, U. S. R. S.

In the November, 1918, issue of the RECLAMATION RECORD a set of tables was published under the caption "Tables showing quantities of water used on projects of the U. S. Reclamation Service, its monthly distribution and other data for the years 1912 to 1917, inclusive." Similar data are now available for 1918 and are given in Table 1.

From some comments received it appears that the accuracy of some of the data published in November, 1918, is questioned and in order to obtain the best information available on this point, each project manager or person who had charge of the water measurements was asked to answer the following questions:

(a) What percentage of all the lands under irrigation is provided with accurate measuring devices. State kind and usual condition. (Sharp-edged weirs and orifices with free fall are examples of what are considered accurate devices.)

(b) What percentage of all the lands under irrigation is provided with measuring devices of uncertain accuracy and what is their probable error. State kind and usual condition.

(c) What percentage of all the lands under irrigation is served by measurements that may be considered only a rough approximation. State methods of determining the quantities delivered.

TABLE 1.—Use of water on United States

1 State and project.	2 Total area irrigated for year.	3 Total quantity of water diverted for direct use (acre-feet).	4 Total quantity of water wasted (acre-feet).	5 Total quantity of water lost (acre-feet).	6 Total quantity of water delivered to farms (acre-feet).	Acre-feet per acre delivered to farms.						
						7 January.	8 February.	9 March.	10 April.	11 May.	12 June.	13 July.
Arizona, Salt River.....	205,616	1,176,681	16,235	540,268	620,178	0.08	0.11	0.21	0.37	0.40	0.40	0.37
Arizona-California, Yuma.....	45,670	314,900	91,800	72,871	150,229	.05	.06	.31	.33	.30	.40	.57
California, Orlend.....	14,764	45,879	2,392	15,224	28,263				.18	.48	.37	.33
Colorado, Uncompahgre.....	58,270	423,050	23,353	32,553	367,144				.39	1.32	1.31	1.20
Idaho, Boise.....	131,500	824,458	42,691	288,951	492,816				.15	.86	.83	.90
Idaho, Minidoka (north side).....	53,830	456,897	18,059	189,123	249,715				.36	.92	.92	1.08
Idaho, Minidoka (south side).....	50,143	228,643	6,092	81,363	141,188				.02	.55	.64	.71
Montana, Huntley.....	18,958	47,982	5,000	22,800	20,182					.02	.40	.31
Montana, Milk River.....	24,842	36,862	6,985	12,977	16,900					.05	.33	.27
Montana, Sun River.....	7,569	30,087	6,794	12,100	11,193					.21	.68	.32
Montana-North Dakota, Lower Yellowstone.....	21,075	51,445	4,001	24,123	23,321					.03	.47	.55
Nebraska, North Platte.....	88,771	392,475	174	147,798	204,819					.17	.53	.66
Nevada, Newlands.....	42,811	266,927	38,918	101,464	126,545			.05	.31	.68	.60	.65
New Mexico, Carlsbad.....	19,460	97,320	1,225	48,715	47,380		.11	.12	.50	.38	.39	.14
New Mexico-Texas, Rio Grande.....	64,781	613,638	123,896	91,459	398,293		.11	.65	.84	.97	.98	.95
Oregon, Umatilla.....	9,100	92,555	14,596	29,796	48,163				.77	1.02	.98	.94
Oregon-California, Klamath.....	38,268	104,926	10,460	42,376	52,090				.02	.38	.39	.29
South Dakota, Belle Fourche.....	52,145	102,994	17,732	33,531	51,731					.03	.46	.17
Washington, Okanogan.....	6,402	9,826	175	3,312	6,339					.23	.32	.16
Washington, Yakima, Sunnyside.....	84,650	415,070	27,320	97,348	290,402				.34	.60	.59	.63
Washington, Yakima, Tieton.....	26,400	90,280	1,150	25,062	64,068				.04	.47	.50	.53
Wyoming, Shoshone.....	38,282	162,463	17,047	61,112	84,304					.25	.70	.61

<sup>1</sup> Principally cotton and cotton seed.

<sup>2</sup> Water shortage this year.

<sup>3</sup> Small indicated loss due to large amount of return water from higher canals.

(d) What percentage of all the lands under irrigation is served without any definite means of determining the quantities delivered.

(c) How often are observations made and record taken of the amount of water being delivered to the land.

(f) What is the aggregate probable error of the figures in columns 6 to 19. In other words, how close may the figures in columns 6 and 19 be reasonably expected to be to the quantity of water actually delivered on the land.

(g) How is the quantity in column 3 determined. How is it measured.

(h) How is the quantity in column 4 determined. How is it measured.

(i) How is the quantity in column 5 determined. How is it measured.

The answers received are, for the most part, very enlightening and assist materially in the interpretation of the published data. The replies are summarized in Table 2.

From Table 2 it is apparent that the tables for the several projects do not give equally accurate information and they can be classified in a general way in their order of accuracy. In most cases the error is that the quantities shown as having been applied to

the land are too small by the percentage noted in column (f) of Table 2. The most common cause for this is that the farmer is usually given good measure in water delivered and is not charged for the full amount. This practice is more common in those cases where accurate measuring devices are not available than where such devices are available, in order that there may be no question that the farmer is getting his full supply of water.

The best available estimate of the accuracy is represented by the percentages stated in column (f) of Table 2 and the amounts applied to the land are usually greater by these percentages than the amounts stated in column 6 of the published tables. This being so, the amounts stated in column 5 would be correspondingly reduced in such cases, because these amounts are determined by subtracting the sum of the amounts stated in columns 4 and 6 from the amount stated in column 3.

The quantities of water diverted as given in column 3 are in all cases determined within a small percentage of probable error. The amounts shown in columns 4 to 19, inclusive, are in most cases as close as it is practicable to measure the water under the present state of the art. In other cases, measurements are apparently rather rough and could be improved upon to advantage.

#### Reclamation Service projects, 1918.

Acre-feet per acre delivered to farms—Cont.						20	21	22	23	24	Percentage of area in different crops.					26
14	15	16	17	18	19	Rain-fall during irrigation season (feet).	Water delivered plus rainfall during irrigation season (feet).	Total annual rainfall (feet).	Mean temperature during irrigation season (°F.).	Average monthly wind movement during irrigation season (miles).	25	26	27	28	29	Area that could have been supplied by the constructed system.
August.	September.	October.	November.	December.	Total.											
0.33	0.41	0.22	0.09	0.03	3.02	0.93	3.95	0.93	69	3,790	19	53	2	2	124	212,966
.56	.42	.22	.04	.03	3.29	.24	3.53	.24	72	4,078	19	24			57	73,000
.24	.23	.08			1.91	.30	2.21	1.37	71		29	64	1	2	1	20,213
.95	.68	.45			6.30	.55	6.85	.92	60	4,280	36	42	1	14	1	100,000
.65	.34	.02			3.75	.60	4.35	1.06	62	3,704	11	50	2		1	194,164
.90	.43	.03			4.64	.41	5.05	.65	60		26	60		6	8	64,515
.58	.30	.02			2.82	.41	3.23	.65	60		39	47		8	6	56,290
.28	.05				1.06	.66	1.72	1.06	67	2,540	46	42		2	10	31,607
.02	.01				.68	.63	1.31	.77	61		31	68		1		61,000
.26	.01				1.48	.50	1.98	.59	62		36	62		2		16,095
.06					1.11	.72	1.83	1.13	64		51	44		2	3	42,232
.65	.30				2.31	1.12	3.43	1.75	66	6,073	33	49		10	8	129,778
.42	.25	.03			2.99	.41	3.40	.52	60	2,263	15	83		2		71,817
.32	.38	.02	.07		2.43	.57	3.00	.66	65		37	37			126	41,575
.75	.70	.09	.11		6.15	.52	6.67	.68	67	8,350	37	47		6	9	90,000
.82	.65	.11			5.29	.27	5.56	.52	63	5,683	7	82		1	2	25,888
.24	.04				1.36	.23	1.59	.79	59		30	69		1		50,000
.26	.07				1.99	1.09	2.08	1.44	65	7,850	31	61		1	4	82,616
.10	.15	.03			2.99	.42	1.41	.85	65		3	29	64	3	1	10,099
.61	.44	.22			3.43	.24	3.67	.46	63		14	54	17	8	7	98,537
.51	.38				2.43	.12	2.55	.45	65		21	43	27	6	3	32,000
.47	.16	.01			2.20	.59	2.79	.68	60		52	44		3	1	55,407

\* Principally sugar beets.

\* Does not include losses in community ditches or laterals except on 50,000 acre-feet. (See note 6.)

\* Only 50,000 acre-feet delivered to farms; balance delivered to laterals and community ditches.



TABLE 2.—Summary of replies to questionnaire regarding measurement of water used on the United States Reclamation Service projects, 1918.

Project.	(a) Percent oflands provided with accurate measuring devices.	(b) Percent oflands provided with measuring devices of doubtful accuracy.	(c) Percent oflands to which water is measured in a roughly approximate manner.	(d) Percent oflands served without definite means of determining the quantities of water delivered.	(e) Frequency of meas. re-ments or observations.	(f) Aggregate probable error of recorded quantity of water delivered to the land.	(g) Method of determining quantity of water diverted.	(h) Method of determining quantity of water wasted.	(i) Method of determining quantity of water lost.	Remarks.
Salt River.....	0	100	0	0	Daily.....	10-15	Current meter	Current meter	Subtraction..	
Yuma.....		100		0	do.....	8-10	do.....	do.....	do.....	
Orland.....	90	9	1	0	Twice daily..	10	Weir and current meter.	Weirs.....	do.....	
Uncompahgre..	80	12	7	1	Daily except Sunday.	5-10	Current meter	do.....	do.....	
Boise.....	90	6	3	1	Daily.....	15	do.....	do.....	do.....	
Minidoka:										
North Side.....	15	85	0	0	do.....	10	do.....	do.....	do.....	
South Side.....	99	1	0	0	do.....	2	do.....	do.....	do.....	
Huntley.....	0	60	35	5	do.....	15	Current meter and weirs.	do.....	do.....	
Milk River.....	5	50	45	0	do.....	25	do.....	Estimated	do.....	
Sun River.....	45	0	25	30	do.....	8-10	Current meter	Weirs.....	do.....	
Lower Yellowstone.	1	1	13	85	do.....	20	do.....	Estimated	do.....	
North Platte.....	65	30	5	0	Daily.....	7-10	do.....	Orifice	do.....	
Newlands.....	75	20	5	0	do.....	10	Calibrated head gates.	Weirs.....	do.....	
Carlsbad.....	48	30	22	0	1 to 3 times daily.	12	Current meter	Weir and current meter.	do.....	
Rio Grande.....	0	25	65	10	Daily.....	15	do.....	Estimated	do.....	
Umatilla.....	90	5	5		do.....	5	Weir and current meter.	Weirs.....	do.....	
Klamath.....	9	87	3	1	do.....	10	do.....	Weir and current meter.	do.....	These figures apply to years 1916 to 1918, inclusive. Prior to 1916 accuracy of measurements is not known.
Belle Fourche..	60	20	10	10	do.....	10	do.....	Estimated	do.....	These figures apply to years 1914 to 1918, inclusive. Prior to 1914 accuracy of measurements is not known.
Okanogan.....	80		20		do.....	5	Weirs.....	Weirs.....	do.....	
Sunnyside.....	91	7	2	0	Twice weekly	5	Current meter	Weir and current meter.	do.....	
Tieton.....	93	5	2	0	2 to 4 times weekly.	5	do.....	do.....	do.....	
Shoshone.....	70	10	10	10	Daily.....	5	do.....	Weirs.....	do.....	

## THE LURE OF THE WEST.

MARATHON, IOWA.

January 12, 1920.

EDITOR, RECLAMATION RECORD.

DEAR SIR: Please mail the RECLAMATION RECORD to the above address. I don't want to miss a copy of it, as the publication is simply grand. I am a water user on the Uncompahgre project, Colo., have lived in the valley for 10 years and reclaimed 80 acres. Have now as fine a home as one would like. Came East a year ago last fall but still hold my ranch out there. I am not satisfied here. Once in the West always in the West.

Will send a picture of my home in good old Colorado.

Yours truly,

W. G. RODINE.



Home of W. G. Rodine, Olathe, Colo

## USE OF ARTILLERY TRACTORS ON SALMON LAKE DAM CONSTRUCTION, OKANOGAN PROJECT, WASH.

By L. V. Branch, Engineer, U. S. R. S.

From the surplus equipment in the hands of the War Department, designed for war use, three artillery tractors were secured for the construction work on the Salmon Lake Dam and Conconully dam enlargement, Okanogan project, Wash.

### DESCRIPTION OF TRACTORS.

These tractors are "Caterpillar" tractors, designated by the War Department as "Ten-Ton Artillery Tractor, Model 1917." The weight of the machine, with full equipment, is 21,500 pounds. The tracks are 15 inches wide and have 96 inches of ground contact, giving a ground pressure of only  $7\frac{1}{2}$  pounds per square inch. The machine has three speeds forward and one reverse; at 600 r. p. m. engine speed the road speeds are 1.47, 2.71, and 4.19 miles per hour forward and 1.09 miles per hour reverse. The drawbar pull on direct (second speed) is 5,200 pounds, and on low (first speed) 8,000 pounds.

The general design and construction of the engine and transmission machinery of the tractor is similar to that of a high-class motor truck, except that two extra dry-plate multiple-disk clutches are necessary in order to furnish independent drive for the two tracks. The engine is the 4-cylinder, 4-stroke cycle, valve-in-head type, with bore of 6.5 inches and stroke of 7 inches, which at 600 r. p. m. develops 55 horsepower. The tractor is equipped with K. W. Model H. K. high-tension magneto with impulse starter, 2-inch Kingston carburetor with Stewart vacuum feed system, dry-plate multiple-disk master clutch, and selective sliding-gear type transmission.

### OPERATING CONDITIONS.

One tractor was used for 3 months (August, September, and October, 1919) for pulling a standard Western elevating grader operating in a borrow pit of fine sand and silt. This elevating grader was loading  $1\frac{1}{2}$  cubic-yard dump wagons hauled by 3-up teams to embankment. The other tractors were used for four months hauling wagon trains from the steam shovel borrow pit to the embankment. As the length of haul was short (1,000 feet) and turning space limited it was considered essential to have tractor train equipment that could turn in narrow spaces. The tractors can turn completely around within their own length; the wagons used as trailers were of the common cut-under dump-wagon type having a capacity, level full, of 3 cubic yards. These wagons, although of heavy substantial construction, were not designed for the heavy use to which they were subjected on this job. The bill for repairs on the wagons was accordingly heavy; about double the repair bill for the team-drawn wagons (see cost data following).

The reversible type of trailer, where the tractor may change to the opposite end of a tractor train at the end of a trip, was not used on this job on account of the short haul and because the above type of trailer can not be turned within as narrow limits as the cut-under type of wagon.

Under usual conditions the tractors easily handled three of these 3-yard wagons, but under adverse conditions of wet ground and on grades for short periods they could handle only two trailers. On any rough, soft ground or on upgrades with loads the tractors were operated in low gear; on level, hard ground or down grades with load, pulling elevating grader, or when running light, the engines were operated on intermediate direct-drive gear. High gear was not used at any time. The tractors had to be brought to a stop to change gears as they have little coasting power.

### OPERATING COSTS.

Due to the repeated stopping and starting of the tractor pulling the elevating grader and the time required for dumping and loading the tractor trains, the mileage per day for the machines was low. The following tabulation gives average mileage per day, also gasoline and lubricating oil consumption by months.

#### Tractor operation: gas and oil consumption.

1919.	Tractor days worked.	Miles traveled.	Average miles per day.	Gallons of gasoline used.	Miles per gallon of gasoline.	Gallons of lubricating oil used. <sup>1</sup>	Miles per gallon of lubricating oil.
August.....	62	659	10.6	1,988	0.33	117	5.6
September...	63 $\frac{1}{2}$	695	11.0	1,955	.36	116	6.0
October.....	61	650	10.7	2,023	.32	113	5.8
November...	37 $\frac{1}{2}$	417	11.1	1,436	.29	69	6.0
Total...	223 $\frac{1}{2}$	2,421	10.8	7,402	.33	415	5.8

<sup>1</sup> Engine and transmission oils; hard oil and track oil not included. Lubricating oils removed from engine were used on tracks; at other times black oil was used for track oil.

Tractor No. 3 did over 90 per cent of the elevating grader work. The miles traveled per day were lower on this class of work; hence this machine shows the highest cost per mile traveled but not the highest daily cost.

The depreciation charged per tractor was \$200 per month; this resulted in excessive unit costs where a tractor was laid up some time for repairs. More uniform costs would result if the depreciation was figured on a mileage or day worked unit. For future work this depreciation charge can safely be somewhat lower than shown in the following table.



*Three artillery tractors. Operating costs, 4 months,  
Aug. to Oct., 1919.*

	Total costs.	Unit cost per mile operated.	Unit cost per operating day.
Gasoline.....	\$2,111.80	\$0.87	\$9.42
Lubricants.....	629.60	.26	2.81
Operator.....	1,391.34	.58	6.21
Repairs.....	697.22	.29	3.11
Miscellaneous supplies and expense.....	563.21	.23	2.52
Equipment depreciation.....	2,400.00	.99	10.72
Total and mean.....	7,793.17	3.22	34.79

NOTE.—Gasoline 28½ cents per gallon. Operator \$5.50 per day. Miscellaneous expense covers, among other things, the cleaning, oiling and greasing of tractors between shifts.

OPERATING DIFFICULTIES.

Throughout August very dry weather prevailed and during this month the tractors, when off the dam, worked in a cloud of dust that rendered them almost invisible at a distance. At this time much difficulty was experienced with carbon in the cylinders of all the tractors. This carbon was in the form of dry flakes or balls that repeatedly short circuited the spark plugs and caused several delays each day.

Analyses of the deposits taken from the engine cylinders during this period showed the following results:

*Tested by Bureau of Standards, San Francisco.*

Sample 1—	Per cent.
Carbonaceous matter.....	60
Mineral matter or dust.....	40
Sample 2—	
Carbonaceous matter.....	40
Mineral matter or dust.....	60

*Tested by Department of Chemistry, State College of Washington.*

Sample 1—	Per cent.
Carbon.....	41.14
Dust or fine sand.....	58.86
Iron—Considerable.	

A change of lubricating oil for the engine was made from an oil manufactured from an asphaltic base crude to one made from a paraffine base crude oil. Thereafter almost no difficulty was experienced with carbon deposits. It happened, however, that welcome rains greatly reduced the amount of dust in the borrow pits at the time the change in oil was made, so it is difficult to state how much of the improvement was due to the new oil and how much to the reduced amount of dust.

When clearing the dam site the tractors were found to be excellent stump and brush pullers. A ¾-inch steel cable was used for this work, experience showing that a ½-inch steel cable would not hold the ma-

chines. In this class of work, the repeated pulling, backing, and turning in small areas causes the tracks to pick up considerable gravel and several track-supporting roller brackets were broken in this way. The difficulty can be obviated by allowing the machine to move either forward or backward far enough to clear the tracks of gravel.

The most serious delays for repairs to tractors during the season were due to grousers (cleats on tracks to increase traction) becoming loose and either catching between the track and frame so as to break the track supporting roller brackets or flying free at one end and, in going around with the track, stripping the overhanging gasoline tank from the frame. The loosening of grousers was not always due to failure to keep grouser bolts tight, but was usually caused when the tractor passed over rocks projecting from frozen ground in such a manner that a considerable portion of the weight of the machine came on a weak point of a single grouser. This caused spreading of V-shaped grouser and release of the tightening bolt.

An attempt was made to operate the machines without the grousers, for the tractors are much easier to operate when running on the flat plate tracks; but for our work they did not have sufficient tractive power unless the grousers were on the tracks. Even with the grousers on the power of the engine is sufficient, in medium or soft soil, to rotate the tracks under the machine when the tractor is stalled.

The wear of the tracks caused no trouble during the past season. A few new track links and track pins will be inserted when overhauling the machines, but in general there is much more service in all the tracks.

ECONOMY IN USE OF ARTILLERY TRACTORS.

On account of the lack of traction in the loose dry silt and fine sand in the elevating grader pit the use of a wheel-type tractor for pulling that machine would have been impossible, while the artillery tractor did excellent service. As compared with the use of teams it can not be claimed that the use of the tractor on this work showed any economy.

In hauling earth on the dam the tractors always hauled from the steam shovel pit and the teams from the elevating grader pit, except for short irregular periods when the teams also hauled from the steam shovel. During these short periods, when the teams hauled from the shovel in competition with the tractor trains, the conditions were abnormal; so it is impossible to give hauling costs where teams and tractor trains did identical work. The hauling to the dam was done, however, under the same supervision and the same labor conditions. Costs of hauling are given as an item in the following tabulations of costs of material placed in the Salmon Lake Dam embankment.

*Excavation and hauling from steam shovel pit to Salmon Lake Dam.*

	Cubic yards, borrow pit measurement.	Total cost.	Cost per cubic yard.
Shovel operations, labor, supplies, plant, and depreciation charges.....	40,996	\$6,241.80	\$0.152
Hauling by tractor trains.....	39,595	6,391.60	.161
Repairs to wagons and minor expense chargeable to hauling.....	39,595	1,363.69	.034
Hauling by teams.....	1,401	306.19	.219
Total.....	40,996	14,303.28	.349

Of the above, 19,169 cubic yards were fine sand and silt, average haul 600 feet, vertical lift 7 feet to 18 feet; and 21,827 cubic yards were sand, gravel, and boulders, average haul 1,000 feet down grade. Worked 90½ shifts; average per shift, 453 cubic yards. Average size of loads per wagon, 3.39 cubic yards.

The shovel, a 35-ton revolving, 1½ cubic yard dipper, was not worked to capacity by the two tractor trains; considerably better results would have been shown if three tractor trains had been worked.

*Excavation and hauling from elevator grader to Salmon Lake Dam.*

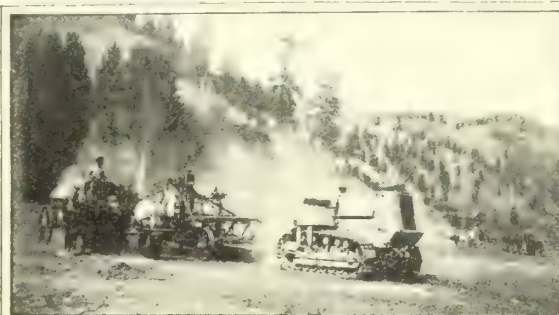
	Total cost.	Cost per cubic yard.
Operation of elevating grader, including all plant and depreciation.....	\$724.29	\$0.020
Operation of tractor, including depreciation charges.....	1,956.23	.055
Hauling by teams.....	6,580.29	.185
Repairs to wagons and minor expense chargeable to hauling.....	571.36	.016
	9,832.17	.276

Of the above 35,600 cubic yards, borrow pit measurement, were fine sand and silt, average haul 600 feet, vertical lift gradually increasing from 7 feet to 19 feet. Worked 69 shifts; average per shift 537 cubic yards. Average size of loads 1.37 cubic yards, borrow pit measurement.

The material as placed in the dam shows a shrinkage of 11½ per cent as compared to borrow pit measurement. The labor and supply cost for spreading, sprinkling, and compacting the material placed in the embankment was just under 6 cents per cubic yard. The total cost of placing 73,558 cubic yards of embankment was \$32,477.93, which gives a unit field cost of \$0.441.

As noted in the above tabulations, the hauling by teams cost 20.1 cents per cubic yard while the hauling by the tractors cost 19.5 cents per cubic yard. The conditions of the two hauls did not vary greatly; considering the entire period, the teams had the poorer roads and slightly more of adverse grades but the advantage of 200 feet shorter haul.

Based on our experience of the past season under the conditions existing on this work, it is our opinion that these tractors, when used for transporting earth, will show greater economy, as compared to hauling with teams, when the length of haul is greater than our average haul of 700 feet and on poor roads and steep grades where teams must be given frequent rest periods. As the length of haul gets shorter and the roads and grades improve the teams will prove cheaper because they can be kept moving more steadily than the larger tractor units and they can make quicker turns at the end of the trip.



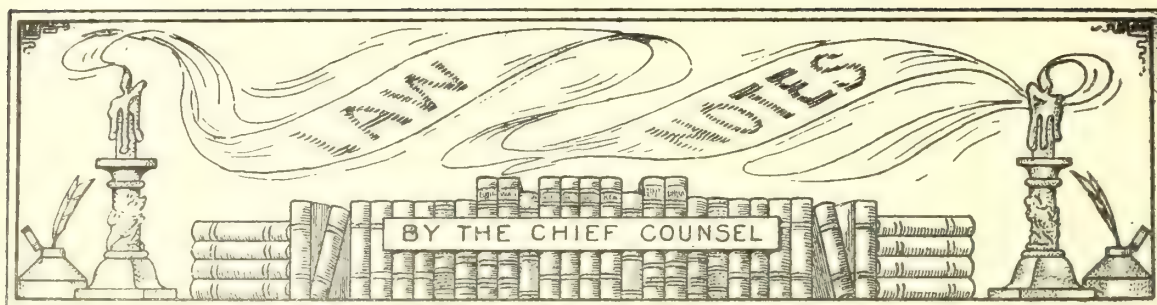
Artillery tractors at work on Salmon Lake Dam construction.

The above has taken no account of the question of maintaining an organization. The operation of the tractor requires the service of an operator and about half time of a repair man, both men of considerable reliability. The tractor, when working, replaced six 3-horse teams requiring the services of six teamsters who were hard to secure and much harder to keep on the job.

"Watch your step" is a fine slogan to be observed in buying shoes. Get them large enough, built on sensible lines and most of your corns and bunions will disappear.

Walking "Indian fashion," that is, with the feet pointed straight to the front, instead of at the customary angle, has been found to be good for weak arches.





### Reclamation Service Wins Million-Dollar Suit.

The Colorado Delta Canal Co. brought suit against the United States in the Court of Claims (No. 29956) for the recovery of the sum of \$1,437,336 for damages alleged to have been caused by the Government adopting the Yuma project in Arizona, under the national irrigation act of June 17, 1902 (32 Stat., 388), thereby forestalling and depriving the company—which alleged that it first conceived the scheme of supplying water to consumers in the Yuma Valley—of its good will, natural right or monopoly, acquired under the laws of Arizona, to irrigate the arid lands of that valley. On January 5, 1920, the Court of Claims filed findings of fact and conclusions of law, under which the petition of the company was dismissed with costs.

### Preference Rights to Soldiers.

Joint resolution giving to discharged soldiers, sailors, and marines a preferred right of homestead entry. (Joint resolution, Feb. 14, 1920, Public Res. No. 29, 41 Stat., —.)

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That hereafter, for the period of two years following the passage of this act, on the opening of public or Indian lands to entry, or the restoration to entry of public lands theretofore withdrawn from entry, such opening or restoration shall, in the order therefor, provide for a period of not less than sixty days before the general opening of such lands to disposal in which officers, soldiers, sailors, or marines who have served in the Army or Navy of the United States in the war with Germany and been honorably separated or discharged therefrom or placed in the Regular Army or Naval Reserve shall have a preferred right of entry under the homestead or desert-land laws, if qualified thereunder, except as against prior existing valid settlement rights and as against preference rights conferred by existing laws or equitable claims subject to allowance and confirmation: *Provided*, That the rights and benefits conferred by this act shall not extend to any person who, having been drafted for service under the provisions of the selective service act, shall have refused to render such service or to wear the uniform of such service of the United States.

SEC. 2. That the Secretary of the Interior is hereby authorized to make any and all regulations necessary to carry into full force and effect the provisions hereof.

### Addition to the Reclamation Fund.

An act to promote the mining of coal, phosphate, oil, gas and sodium on the public domain. (Act Feb. 25, 1920, Public No. 146, 41 Stat., —.)

SEC. 35. That 10 per cent of all money received from sales, bonuses, royalties, and rentals under the provisions of this act, excepting those from Alaska, shall be paid into the Treasury of the United States and credited to miscellaneous receipts; for past production 70 per cent, and for future production 52½ per cent of the amounts derived from such bonuses, royalties, and rentals shall be paid into, reserved, and appropriated as a part of the reclamation fund created by the act of Congress, known as the reclamation act, approved June 17, 1902, and for past production 20 per cent, and for future production 37½ per cent of the amounts derived from such bonuses, royalties, and rentals shall be paid by the Secretary of the Treasury after the expiration of each fiscal year to the State within the boundaries of which the leased lands or deposits are or were located, said moneys to be used by such State or subdivisions thereof for the construction and maintenance of public roads or for the support of public schools or other public educational institutions, as the legislature of the State may direct: *Provided*, That all moneys which may accrue to the United States under the provisions of this act from lands within the naval petroleum reserves shall be deposited in the Treasury as "Miscellaneous receipts."

### Congressional Bills of Interest to Our Readers.

#### IN THE SENATE.

S. 3758.—"A bill to authorize advances to the reclamation fund and for the issue and disposal of bonds in reimbursement therefor, and for other purposes." Introduced January 20, 1920, by Senator Charles L. McNary, of Oregon.

S. 3829.—"A bill making an appropriation for the investigation of underground currents, particularly shallow underground waters, and artesian wells in eastern Colorado." Introduced February 2, 1920, by Senator Lawrence C. Phipps, of Colorado.

S. 3852.—"A bill for the relief of the Garden City (Kansas) Water Users' Association, and for other purposes." Introduced February 4, 1920, by Senator Charles Curtis, of Kansas.

## IN THE HOUSE.

*H. R. 11959.*—"A bill to provide for a reclamation project on the North Fork of Grand River and Spring Creek in the counties of Bowman and Adams, in the State of North Dakota, and the counties of Harding and Perkins, in the State of South Dakota." Introduced January 21, 1920, by Representative Harry L. Gandy, of South Dakota.

*H. R. 11961.*—"A bill to authorize advances to the reclamation fund and for the issue and disposal of bonds in reimbursement therefor, and for other purposes." Introduced January 21, 1920, by Representative Moses P. Kinkaid, of Nebraska.

*H. R. 12013.*—"A bill for the reclamation of lands in the Imperial and Coachella Valleys, California, and for other purposes." Introduced January 23, 1920, by Representative Addison T. Smith, of Idaho.

*H. R. 12466.*—"A bill authorizing the granting of certain irrigation easements in the Yellowstone Na-

tional Park, and for other purposes." Introduced February 11, 1920, by Representative Addison T. Smith, of Idaho.

*H. R. 12488.*—"A bill to provide employment, homes and additional bonus for those who have served with the military and naval forces of the United States during the war between the United States and Germany and her allies through the reclamation, acquisition, and development of lands and building of homes to be known as the national soldier settlement, home, and bonus act." Introduced February 12, 1920, by Representative Adolph J. Sabath, of Illinois.

*S. 795.*—"An act to provide for the disposition of public lands withdrawn and improved under the provisions of the reclamation laws, and which are no longer needed in connection with said laws." Passed the Senate February 2, 1920, and is now being considered in the House.

—Will R. King.

## RECLAMATION ABROAD.

## Notes From Commerce Reports.

## Murray River Dam, Australia.

Work is shortly to commence on the construction of the Upper Murray Weir at a point 6 miles above Albury, New South Wales, according to a recent issue of the *Industrial Australian*. The dam will impound 1,000,000 acre-feet of water and the building of it is estimated to occupy from six to seven years.

## Lethbridge Northern Irrigation Project, Canada.

Plant for the Lethbridge northern irrigation project are nearing completion and it is probable that the vote on the proposed bond issue will be taken in the latter part of February. Estimates under consideration call for an expenditure of \$3,000,000 to \$4,000,000, according to H. B. Muckleston, chief engineer. The project will include about 500 miles of waterways and will serve more than 100,000 acres of land.

The provincial government will be asked during the next session of the assembly to guarantee the bonds, and construction work will be started early in April.

## Sundays River Project, South Africa.

Work on the Sundays River conservation dam is progressing somewhat slowly on account of the difficulty of securing machinery.

This is the largest irrigation scheme at present being worked out in South Africa. For some years the flood waters of Sundays River have been utilized to supplement a scanty rainfall in the fertile valley, but it was realized that a conservation dam was necessary to provide sufficient water for the 40,000 acres of irrigable land.

Upon petition of practically all of the landowners the Union Government declared the Sundays River Valley an irrigation area and arranged to finance the scheme through the medium of a loan to the Sundays River irrigation board.

The director of the works is Circle Engineer R. W. Newman, who is loaned by the Government for the purpose. The dam is situated about 120 miles from Port Elizabeth and 33 miles from Wolfefontein, the nearest railroad station, where the Sundays River leaves the semiarid Karoo and enters the mountainous districts. The capacity of the reservoir will be about 120,000 acre-feet. An excellent bed-rock foundation not many feet below the surface is being utilized and material for the construction of the dam is available close at hand. The dam will be 1,200 feet long, 77 feet wide at the base, and from 120 to 130 feet high. Five sluice gates 25 feet high by 30 feet broad and with sills 50 feet above the ground will be constructed. No retaining walls at the sides of the dam will be necessary. The cost of the work is estimated at \$1,459,950, and it will probably take five years to complete it.

## Subsidies for Electric Power Development in Italy.

Under the terms of a recent decree provision is made for encouraging the use of electric power in connection with agriculture and irrigation. A premium of 0.03 lire per kilowatt hour will be paid by the Government for a period of not more than 10 years to firms or individuals for current utilized exclusively in the cultivation and harvesting of crops. The same premium will also be paid where irrigation works are supplied with



water electrically pumped. Those operating electric plants enjoying subsidies from the Government are obliged to reserve a portion of the current produced up to 10 per cent, which must be furnished at the price made to the most favored user for agricultural and reclamation projects.

### EDWIN HOWE PEERY, 1856-1920.

Edwin Howe Peery was born July 27, 1856, in Grundy County, Mo. He married, December 26, 1900, Patti Anderson Yates, daughter of Anderson and Malinda Harris Yates, of Trenton, Mo. She was born November 9, 1866, in Madison County, Ky., and died in the same county May 12, 1908. They had no children.

Mr. Peery was educated at Grand River College, one of the oldest institutions of learning in the State of Missouri, and situated near the place of his birth. He studied law in the State of California, graduated from the law department of the University of the

State of Missouri, and from the Columbian (now the George Washington) University, of Washington, D. C., receiving the degree of Master of Law from the latter institution. He was admitted to the bar of California and of Oregon, and also to the bar of the Supreme Court of the United States.

In 1894 he entered the Government service at Washington, D. C., as examiner in the Civil Service Commission, but was afterwards transferred to the Treasury Department, and thence to the Reclamation Service, always performing duties of a legal nature. In January, 1907, on account of the failing health of his wife, he went to Cuba and was made an assistant attorney to Brig. Gen. Enoch H. Crowder, who was then supervisor of the departments of state and justice in the provisional government of that country under the United States. He spent two years in Cuba, during which time his wife died. Returning to the United States he for a time practiced law in Portland, Oreg., but later again took up Government work as district council in charge of land titles for the United States Reclamation Service. He continued in this employment until the time of his death, which occurred at Yuba City, Calif., January 29, 1920. His remains were interred in Greenwood Cemetery, Portland, Oreg., February 2.

The deceased is survived by his mother, Mrs. Ruth J. Peery, Forest Grove, Oreg., one brother, Leslie T. Peery, Portland, Oreg., and two sisters, Miss Georgia R. Peery, Portland, Oreg., and Mrs. Laura B. Peery, Yuba City, Calif.

Mr. Peery was a man of sterling character, loyal in his friendships, and high minded in his citizenship. He was an excellent lawyer, and an expert in land-title work. His position with the Reclamation Service was a responsible one that he filled capably and conscientiously.



Edwin Howe Peery

### OUR SERVICE.

Oh, it isn't for the money and it isn't for the fame,  
And it isn't for the plaudits or the cheers,  
But for joy that's in the working, and for fun that's  
in the game  
That we've taken up the trade of Engineers.  
We may camouflage ideals with some babble—mostly  
sham—  
Of our wish to mount the money-temple's stairs,  
But when it comes to cases we don't give a tinker's dam  
For the millions of a dozen millionaires.  
We don't pose as brave crusaders, but we certainly  
crusade  
In an everlasting fight with mother earth;  
Every dam that we have builded, every structure we  
have made,

Every ditch that belts the planetary girth  
Is a monument of struggle for the betterment of man  
And we did it as we do it, and we will,  
By the urge of what's inside us, by the spirit of our  
clan,  
And it's something more than money pays the bill!  
Though we like our share of treasure and the pleasure  
that it brings,  
It is something else which drives us to our goal;

It's the triumph of our labor over elemental things  
And the Vision which gives splendor to the whole.  
We are members of an order that is guided on by  
dreams,  
By the voices of the prophets and the seers.  
And unless you care for Service more than money-  
getting schemes,  
You had better never join the Engineers.

—Slightly modified from Berton Braley, in *Life*.

## THE OPEN FORUM.

### A Boost for the Boise Project.

In the December issue of the RECLAMATION RECORD we published an article under the title "A successful water user," calling to the attention of our readers the success of Mr. B. W. Barth in the development of his homestead from a habitat of jack rabbits and sagebrush into one of the most highly improved farms on the project. The article contained the following paragraph:

Mr. Barth is happy to state that he is at all times ready to help promote anything for the benefit of the project. He is now satisfied that the construction charge can easily be met by the average farmer on the project, and says that although there are always a few disgruntled settlers and agitators who refuse to agree on any proposition, fair or otherwise, on their general principles of discord, this class is gradually dropping out and is being replaced by the intelligent farmer, who is winning out and meeting the construction payments as they fall due.

In our pristine innocence we had fondly imagined that on practically all of our projects there had been in the past, and might possibly still be, one or two otherwise highly desirable citizens who might come under the generic classification of "disgruntled settlers and agitators." We were highly gratified to note that these gentry were fast becoming extinct on the prosperous Boise project, and, with a metaphorical slap on the back of the progressive Boise settlers, O. K'd the article for publication. Little did we realize at the time the charge of T. N. T. that hapless paragraph contained, as witness the following:

FEBRUARY 12, 1920.

MR. HUGH A. BROWN,

Washington, D. C.

DEAR SIR: At the regular meeting of the board of directors of the Payette-Boise Water Users' Association, in Caldwell, Idaho, held on the 10th day of February, 1920, the following resolution was presented and unanimously adopted:

"Whereas there having appeared in the December, 1919, issue of the RECLAMATION RECORD an article entitled 'A successful water user,' purporting to extol the efforts and success of one B. W. Barth, of the Boise project; and

"Whereas the said article contains a certain paragraph concerning the ability of the farmers of the project to pay the construction charge as established by the Secretary of the Interior; and

"Whereas in the paragraph reference is made to 'disgruntled settlers and agitators,' and calculated to influence members of the Payette-Boise Water Users' Association

against the action of the directors thereof in the suit now pending: Therefore be it

"Resolved, That the board of directors hereby take exception to the said obnoxious article and that the secretary be, and is hereby, instructed to ascertain the author of the article aforesaid with a view of securing a correction to the same. The same correction to be published in the next issue of the RECORD. And be it further

"Resolved, That the policy of the RECORD in publishing such a misleading article is worthy of the strongest condemnation."

Yours, truly,

(Signed)

L. J. M.,

Secretary.

Evidently explanations are in order, so we hasten to reiterate that our only thought in leaving the aforesaid dynamitic paragraph in the article was one of elation at the passing of seemingly obstructive forces in the progress of the Boise project—a progress so well portrayed in the article by Mr. James R. Stotts, of Boise, entitled "Boise Valley's marvelous development," on page 79 of the February issue of the RECORD, reprinted from the Evening Capital News, Boise, Idaho. If, however, we have inadvertently stepped on the toes of any of our good friends on the project, we ask them to "have one on us" (metaphorically, of course), and join with us in actively boosting for the future well-being of this wonderfully successful project to the best of our mutual ability, hereby serving notice that the Boise project is no place for "disgruntled settlers and agitators."

Beware of bootleg liquor, for much of it contains wood alcohol and other poisons. An ordinary swallow of wood alcohol may produce death or blindness. Don't risk it.

Hot house people are like hot house plants. They can't stand exposure to severe weather. Sleep with the windows open and keep every room well ventilated.

Walk a mile each day to keep the doctor away. Try walking to work every morning and see if it doesn't make you younger and healthier.



## JANUARY WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

In the Western States the opening month of 1920 was, in the main, mild and dry, although an unusual amount of variation appears in the conditions of different portions. The first half of the month had much cool weather in most Western States, except in the middle and northern Plains and in portions of California. Indeed, about the 10th some decidedly cold weather dominated the middle Plateau region. The latter half was warm for the season, save that for about a week, from the 20th onward, cold weather prevailed near the Canadian border, and to eastward of the Rocky Mountain Divide, particularly in Montana and districts adjoining. The month averaged warmer than normal in nearly all portions of the West, being 7° or 8° warmer in parts of Colorado, Wyoming, and western Nebraska; but averaged cooler than normal in most of western Texas, in northeastern Montana, and most of North Dakota, and in a few other areas.

In most central and southern districts to eastward of the Sierra Nevada the first half of the month had most of the precipitation, the first few days being especially stormy. In California and Oregon the first few days and the final decade brought most of the precipitation. In northern districts, as a rule, the middle decade of the month and the first part of the final decade had most of the precipitation. The total fall of the month was especially small, compared with normal, in California, southern Oregon, and most of Nevada; and was somewhat less than normal in central and western Utah and in most districts west of the Continental Divide and north of the 42d parallel, also in the Plains region from South Dakota southward to western Kansas and northeastern New Mexico. Amounts above normal were received in nearly all of Arizona, much of New Mexico, eastern Utah and western and central Colorado, central Wyoming, the eastern half of Montana, and most of North Dakota. The snowfall was especially light in California, Nevada, and Oregon, where it had been scanty most of the preceding months of winter and late fall.

The month was mainly favorable for live stock and for such outdoor work as is usual at this season. There was some severe weather, particularly in Montana, but it was of brief duration compared with the bad weather of earlier months. In portions of California the dryness was unfavorable for crop growth, but in most of Arizona and New Mexico conditions were unusually favorable.

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BUY WAR SAVINGS STAMPS.

## HEALTH NOTES FOR OUR SETTLERS.

### The New Sector in the Public Health Campaign.

Against one group of diseases effort on any large scale has been conspicuously lacking. In fact, as far as any preventive measures are concerned, the usual policy has consisted in absolute silence or neglect, a method which has not shown the slightest good result. Yet to these diseases, immeasurable suffering may be directly traced. To one of them is due 15 per cent of all insanity. All cases of locomotor ataxia, and many cases of paresis and early paralysis can be traced definitely to it. Infant mortality is three times as large among children whose parents are afflicted with these diseases, as among those having normal parents. To another disease of this class may be attributed thousands of cases of blindness among babies. It makes necessary many surgical operations on women, and often brings about sterility in both men and women. If diseases causing a similar amount of suffering and economic waste should suddenly appear in epidemic form throughout the country, public opinion would readily support a heavy appropriation for a campaign against them. Yet only the emergency of the war brought about comprehensive efforts by public authorities on a national scale for the control and elimination of these so-called venereal diseases.

The program of the Division of Venereal Diseases of the Public Health Service and of the State Boards of Health to which considerable sums were allotted for this specific purpose covers the field in a very comprehensive way. It provides, first, for the medical attack upon this problem. Venereal diseases are communicable. For public protection, therefore, the elimination of carriers at the earliest possible moment should be provided for and the persons infected saved from the more serious consequences of the diseases.

An attack in the legal field has also been vigorously pushed. A carefully considered program for sex education in the schools has been formulated and its introduction, where properly qualified teachers are available, encouraged. The "Keeping Fit Campaign," described in the February issue of the RECLAMATION RECORD, is an essential part of this educational attack.

Finally, it is hoped to encourage the provision of proper recreational facilities.

This comprehensive campaign endeavors to reach every section of the country, every class of the population. The problem of the control of venereal diseases is extremely important in the rural community. This campaign, which calls for the cooperation of all public spirited citizens in its effort for individual happiness and national efficiency, must be carried forward as vigorously in rural as in urban communities.

## MONTHLY PROGRESS REPORTS FOR JANUARY.

*Monthly conditions of principal Reclamation Service reservoirs for January, 1920.*

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.....	Roosevelt.....	1,305,000	2128	1903	1,034,960	1,199,061	1,199,061	15,350	2106.89	2117.7	2117.7
California, Orland.....	East Park.....	51,000	1199.68	1111.68	3,150	5,000	5,000		1150.53	1155.74	1155.74
Idaho:											
Boise.....	Arrowrock.....	280,000	3211	3018	36,813	52,900	53,780	39,736	3082.3	3099	3099.8
	Deer Flat.....	177,000	2518	2488	49,705	51,779	51,779		2501.2	2501.6	2501.6
Minidoka.....	Lake Walcott.....	53,500	4245	4240	10,990	42,450	42,450		4243.77	4243.9	4243.9
	Jackson Lake.....	846,000	6769	6730	79,580	106,580	106,580		6734.53	6736.01	6736.01
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	22,500	21,300	22,500		2210.5	2210.1	2210.5
St. Mary Storage.....	Sherburne.....	33,000	4765	4720							
Sun River.....	Willow Creek.....	16,700	4130	4085	1,417	2,120	2,120		4101.8	4105.1	4105.1
Nebraska-Wyoming, North Platte.	Pathfinder.....	1,070,000	5852	5670	222,110				5786.82		
	Lake Alice.....	11,400	4182	4159	7,313	6,266	7,313		4176.2	4174.5	4173.8
	Lake Minatare.....	67,000	4125	4074	58,204	56,923	58,204		4123.8	4123.2	4123.8
Nevada, Newlands.....	Lake Tahoe.....	6120,000	6230	6224					6225.31	6225.07	6225.31
	Lahontan.....	290,000	4162	4060	157,280	169,880	169,880		4111.7	4119.2	4119.2
New Mexico:											
Carlsbad.....	McMillan.....	51,000	3267.7	3241.6	43,750	45,000	45,000	24,000	3267.5	3267.7	3276.2
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4231.5	1,041,303	1,068,622	1,068,622	12,841	4351.2	4355.5	4355.5
Oregon, Umatilla.....	Cold Springs.....	50,000	621.5	560	11,700	16,200	16,200		581.5	592.9	592.9
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	307,700	307,700	307,700	578	4533.9	4533.9	4533.9
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	100,380	113,150	113,150		2959.8	2961.9	2961.9
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	166,000	168,000	168,000		7546.5	7546.8	7558
Washington:											
Okanogan.....	Conconully.....	13,000	2287	2232	1,128	1,394	1,394		2250	2251	2251
Yakima.....	Bumping Lake.....	31,000	3426	3389	16,910	17,100	27,100		3413.3	3420.7	3420.7
	Lake Clealum.....	22,800	2134	2122	26,915	17,170	29,495	2,345	2135.2	2135.3	2136.3
	Lake Kachess.....	210,000	2258	2192	125,250	149,055	149,055		2134.5	2140.8	2140.8
	Lake Keechelus.....	152,000	2515	2425	46,130	75,590	75,590		2460.1	2479	2479
Wyoming, Shoshone.....	Shoshone.....	456,600	5360	5132.3	323,923	304,338	325,923	41,621	5337.7	5333.9	5337.7

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> U. S. storage begins at elevation 6229.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZ.

*Operation and maintenance of irrigation system.*—Water was run intermittently in all of the canals during January. Owing to considerable rainfall the demand for irrigation water was very light, the lowest in the history of the project. The Salt and Maricopa Canals were given their annual cleaning.

During the month the organized force of two maintenance camps, aided by extra labor from Phoenix, placed approximately 5,000 cubic yards of concrete in the apron of Granite Reef Dam, operating three concrete mixers day and night with a force of about 260 men; 180 head of stock was used in hauling the material for the three mixers. Besides the above-mentioned camps there were four maintenance camps in the valley. The following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 445; average head of stock, 203; miles main canals cleaned, 64½; miles laterals cleaned, 49½; number of new structures, 10; number of old structures, 98; riprap placed, 625 feet; concrete placed, 5,003½ cubic yards; dry masonry placed, 182 cubic yards; concrete pipe laid, 220 feet; dirt fill placed, 75 cubic yards.

The dragline excavator No. 1 was entirely overhauled during the month. Toward the end of the month work was commenced on widening the eastern canal. About 500 feet of bank was stripped ready for the drillers.

The Ruth dredge moved 3,000 cubic yards of berm from eastern lateral 12 south and traveled 14 miles to new position at the pumping plant on the western canal where the machine was temporarily laid up for repairs, after which it began to remove berm from the north bank of the western.

*Operation of power system.*—The Roosevelt power plant operated continuously. During the entire month water from the reservoir was used for developing power in excess of the demand for irrigation purposes. The Cross Cut power plant operated continuously. The South Consolidated power plant operated 86.6 per cent of the month. During a period of a few days when the water was out of the canal, the water under the power house was pumped out, the foundations examined and found to be O. K. The Arizona Falls power plant operated 45.3 per cent of the month. The Chandler power plant was placed in operation on January 12. The operation of the plant is satisfactory.

All pumping plants were available for operation as needed. The overhauling of the pumps at the High-line plant was completed.

The cleaning and overhauling of the transformers at the Phoenix substation was completed.

*Construction work, Roosevelt.*—The pouring of the concrete in the North Tunnel excavation was completed January 3. Work was dropped on the north tunnel job and attention turned to protection work on the south spillway in anticipation of the overflow of



the spillways. The paving of the south spillway floor was extended and a new cut-off or toe wall started.

**Chandler power plant.**—The reconstruction of the forebay was completed and the plant operated on January 12. The rubble masonry lining of the north bank of the tail race was extended to the bridge.

**Peoria power system.**—The power lines and system for Peoria were completed, except the installation of the permanent transformer.

**Scottsdale power system.**—The power lines and system for Scottsdale were about 85 per cent complete.

**Office.**—The following acreages were entitled to irrigation water service on the first of the month.

	Acreage.	Number of applications.
Permanent.....	131,631.50	3,157
Normal flow.....	1,050.00	230
Temporary.....	8,778.50	202
Town site.....	3,973.75	6
	145,433.75	3,595

—W. R. Elliott.

#### YUMA PROJECT, ARIZONA-CALIFORNIA.

January weather conditions were fair. Labor for project work was scarce, owing to ranchers offering laborers more money.

**Construction.**—On the Yuma Valley main drain the Bucyrus dragline excavator moved 8,000 cubic yards of material Station 857 to Station 881. One wooden culvert was placed in the drain at the Twelfth Street crossing, Station 869.

**Operation and maintenance.**—Approximately 2,200 acre-feet of water were delivered to about 4,000 acres. In the Yuma Valley the Monighan dragline No. 2 moved 2,200 cubic yards of silt from the west main canal, Station 835 to Station 848. The V machine operated on cleaning laterals during the month. In the Yuma Indian Reservation canal cleaning was carried on by teams and by hand.

The sale of Mesa lands was continued by the receiving of sealed bids, which were opened on January 20 and 27. Ten tracts, with an approximate area of 130 acres, were sold.

The maximum discharge of the Colorado River for the month was 32,500 second-feet, minimum 6,800 second-feet, mean 11,400 second-feet. The gage on January 31 was 17.45 with discharge of 13,600 second-feet. The acre-feet discharge for the month was 701,451.

Oliver P. Morton, district counsel, visited the project the latter part of the month. W. W. Schlecht.

#### ORLAND PROJECT, CALIFORNIA.

The temperature for January was moderate. The precipitation was 0.14 inch, the least for any January in the 35 years for which records at Orland are available. The rainfall for the season is 3.21 inches, which is about 7 inches below normal. There was almost no pasturage for stock, especially on the dry ranges. This caused a sharp advance in price for alfalfa, which sold at \$28 to \$30 per ton in the stack. On account of scarcity of nursery stock very little orchard planting was done. Except that the ground was somewhat dry, conditions were ideal for grading land and other farm development work. Sales of both improved and unimproved farms were especially heavy, and many new settlers came into the project. The farm ship-

ments for the month were: By carload: Hay, 11; barley, 2; wheat, 2; milo, 1; and oranges, 1; by less than carload: Butter, 62,850 pounds; poultry 24,450 pounds; eggs, 17,670 dozen; dressed veal, 2 tons; and olives, 2 tons. The small amount of water available from Stony Creek was turned in for irrigation on the 25th. At East Park only 1,850 acre-feet of water were accumulated. Most of this was obtained through the feed canal. The maintenance force was increased over the previous month, and 18½ miles of laterals were cleaned and repaired. An average force of 40 laborers and 14 head of stock was employed on concrete lining, completing the work on the High Line on the 29th. A total of 19,122 (948 cubic yards) square yards of lining was placed during the month—the largest single month's output under the supplemental agreement.—A. N. Burch.

#### Prevailing crop prices at close of January, 1920.

Project.	Alfalfa hay, per ton.		Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at shipping point.				
Salt River.....	\$20-\$24	\$26-\$30	\$1.62		\$2.16	
Yuma.....	25.00	30.00				
Orland.....	28.00	30.00	1.80		2.20	
Grand Valley.....	22.50	27.50	1.40	\$0.88	1.93	\$3.00
Uncompahgre Valley.....	14.00		1.50	.90	2.00	1.85
Boise.....	21.00	30.00	1.44	1.15	1.85	5.00
King Hill.....	22.50	27.50		1.16		3.06
Minidoka.....	16.00	21.00	1.49	1.02	2.22	2.40
Huntley.....		25-30		1.00	2.40	
Milk River.....	25.00	30.00	1.14		2.51	3.60
Sun River.....	28.00	35.00	1.30	.90	2.60	2.50
Lower Yellowstone.....	25.00		1.20	1.00	2.60	3.00
North Platte.....	16.00		1.30	.90	2.20	2.40
Newlands.....	17.00	22.50			3.00	3.00
Carlsbad.....		32.00				
Rio Grande.....		30.00				
North Dakota pumping.....						
Umatilla.....		29.50				
Klamath.....	20.00	30.00	1.40	.93	1.95	
Belle Fourche.....	25.00				2.80	3.30
Strawberry Valley.....		33.00		1.18	2.55	2.70
Okanogan.....	25.00					3.00
Yakima:						
Sunnyside unit.....	20-22.50	26.00			2.25	2.40
Tieton unit.....	20-22.50	26.00			2.25	2.40
Shoshone.....	120.00	27.00		1.10	2.50	1.80
Indian projects:						
Blackfoot.....	32.00		1.12	.79	2.48	
Flathead.....		35.00		1.10	2.70	3.00
Fort Peck.....	30.00	35.00		.81	2.59	3.00
Riverton.....						

<sup>1</sup> Delivered at mill.

#### GRAND VALLEY PROJECT, COLORADO.

January weather was cold and snow covered the ground throughout the month. There was very little frost in the ground but outside work was rendered difficult on account of the nearly impassable condition of many of the roads. Ample labor was available for all operations of the project.

Practically no farm work was undertaken except the feeding of live stock. The severe winter has made it necessary to feed range cattle for a much longer period than under normal conditions and this has resulted in a strong demand for alfalfa hay, which is very scarce and is commanding a high price.

Very little outside maintenance work was undertaken and the small maintenance force, consisting of

the regular employees, was employed in building weirs and turnouts at the camps, repairing several vitrified pipe main canal turnouts, overhauling the machinery at the Price-Stub pumping plant, and repairing the concrete in Tunnel No. 3 in which a number of cracks had developed.

In the Grand Valley Drainage District work was continued on Drain C with dragline No. 3 until the latter part of the month, when this machine was laid up for repairs. Three thousand seven hundred and seventy lineal feet of drain were completed, involving 18,600 cubic yards of excavation. On account of the difficulty of transporting men and supplies to the machine, dragline No. 1 was not operated during the month. Dragline No. 2 was given a thorough overhauling preparatory to resuming work as soon as weather conditions permit in the spring. The structure crew installed one corrugated iron road culvert on Drain C and one wooden canal culvert on Drain F.

The office force was employed in the preparation of farm unit plats and other data relating to lands to be opened to entry in the spring, and in the compilation of the annual project history and other routine matters.—*S. O. Harper.*

#### UNCOMPAHGRE PROJECT, COLORADO.

January weather was pleasant with very little precipitation, but owing to the amount of snow on the ground no farm work or construction work was performed and only a minimum amount of maintenance work.

The price of alfalfa, potatoes, and onions remained high.

A small amount of water was carried in some of the canals for domestic and stock use.

A considerable percentage of the canal and lateral system was brushed, and extensive repairs were made to the East Canal headworks. A new waste gate was installed and a concrete floor placed below the overflow weir. A considerable amount of gravel was hauled for repair work to the concrete lining on the South Canal.

Practically no construction work was in progress.—*Fred D. Pyle.*

#### BOISE PROJECT, IDAHO.

During the early portion of January very cold weather prevailed. About the 16th the thermometer commenced an upward movement which resulted in a chinook. Warmer weather, accompanied by intermittent rains and fogs, lasted throughout the balance of the month.

*Labor conditions.*—Labor conditions remain unchanged from December. Due to weather conditions considerable work was suspended, which resulted in throwing quite a number of men out of employment. It is expected, however, that work will be resumed which will utilize all available labor.

*Farming operations.*—The farmers were occupied during January in feeding stock and in bailing and hauling hay. Car shipments from Caldwell during the month aggregated 567 cars and were classified as follows: Cattle, 38; hogs, 2; horses, 25; sheep, 49; flour, 16; wheat, 8; potatoes, 4; and hay, 425.

*Water supply.*—The precipitation during the month was below normal. Reports show considerable snow on the high-drainage area.

The average daily flow of Boise River for January was 1,074 second-feet, which is lower than the mean of the last 25 years.

*Operation and maintenance.*—After considerable work was done in the way of opening a channel through the ice jams at the lower end of the Main Canal, a small head of water was turned in at the head on January 16. This head was gradually increased from that date, so that at the end of the month the canal was carrying approximately 425 second-feet, which was discharged into Deer Flat Reservoir.

A small amount of repair work was accomplished.

*Construction.*—Work was continued on completing the suspended contract of William Long. This work consisted of rock excavation between stations 204 to 238 of the Notus Canal.

*Drainage, Riverside District.*—Considerable time was lost on this unit during January due to severe weather conditions. Electric drag line No. 3 worked 15 days on the South Alkali drain and excavated 25,800 cubic yards of material. Drag line No. 4 worked only three days and excavated 6,250 cubic yards of material on the Riverside drain. When in operation two shifts were employed on each machine.

*Surveys.*—Field surveys made during the month consisted of those in connection with the drainage work in progress and miscellaneous surveys on land classification of irrigable areas.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

January weather was cold during the first part of the month and unfavorable for construction work. During the latter part it began thawing and work was delayed on account of bad roads interfering with the hauling of construction material. The labor supply was plentiful and it was unnecessary to ship men in from outside points.

At Camp 4 wasteway No. 2 was completed as well as the One Mile flume and work was started on the repairs to the head end flume. Work was also continued on the repairs to the lined section of the canal at station 230.

At Camp 5 the work on Deer Gulch siphon was practically completed with the exception of laying the wood-stave pipe, the bands for which have not yet arrived; the section of the Four Mile flume necessary to connect up with the outlet of Deer Gulch siphon was poured. Wasteway No. 9 was completed and Wasteway No. 8, including the portion of the flume on trestle, was completed by the end of the month with the exception of removing forms and some back-fill work. All structures completed during the month had to be protected from freezing weather.

One engineering party was employed at each camp giving lines and grades on construction work.

The office engineering and clerical forces were employed on routine work and on the preparation of the annual project history, the work on which progressed favorably.

No operation and maintenance work was done.—*Walter Ward.*

#### MINIDOKA PROJECT, IDAHO.

Precipitation at Jackson Lake amounted to 2.87 inches up to January 27. The total precipitation since September 1 amounts to 10.01 inches, and about equals the entire amount which occurred last year.

During January the discharge at Howells Ferry amounted to 286,490 acre-feet as compared with 280,760 acre-feet for December. At Jackson Lake the gates remained closed throughout the month, and the



water surface rose from 6,734.53 on December 31 to 6,735.85 on January 27, corresponding to a storage of 24,070 acre-feet during the month, and 103,650 acre-feet to date. On the corresponding date last year the storage amounted to 279,840 acre-feet.

Revised drafts of the contract covering the construction of the American Falls Reservoir were submitted to the Denver office on January 5. Since that time in response to requests by interested parties 14 meetings throughout the valley have been attended for the purpose of explaining the terms of the contract and advising as to the procedure required for acquiring the storage.

On the Minidoka North Side dumping unit a small force was employed throughout the month, checking up data obtained during the summer and making them matters of permanent record. A level party ran 41½ miles of check levels, making a total of 476 miles of original bench levels and 65½ miles of check levels run to date. One field party worked from the 1st to the 19th on checking up topography sheets on which errors were found. Office work consisted in checking and inking topographic sheets, comprising a coordinate system covering all sections and one-quarter sections on the unit, and reducing topographic sheets from 400 to 1,000 feet to the inch.

On the Minidoka gravity unit a field party has been engaged since the 19th on running profiles on the constructed drains and taking cross sections of the drains every 500 feet, 31 miles of profiles or 26 per cent being completed.

The compiling of the annual project history was in progress.

The visitors to the project included many members of the Idaho Reclamation Association and delegates to the convention held in Burley on January 27, including S. E. Brady, president, and Fred R. Reed, executive secretary, O. H. Barber, State commissioner of immigration, and Ern G. Eagleson, mayor of Boise.—*Barry Dibble*.

#### HUNTLEY PROJECT, MONTANA.

January was in general clear and mild with a short cold spell from the 20th to the 27th. A total of 8½ inches of snow fell during the month, but it did not stay on the ground long.

The loading of the Lidgerwood dragline excavator was completed on the 12th and shipment released for Augusta, Ga., on the 17th.

Several hay bailing outfits worked on the project in January during clear weather and these operations were about finished at the end of the month.

Considerable repair work was done at the headquarters camp on the automobiles and trucks and at the pumping plant site on the hydraulic pumps in preparation for the coming season. A large part of the equipment in the field was hauled into the project headquarters and overhauled or scrapped according to its condition. No other work in the field was carried on except the surveying of a few lots in the Anita townsite and the taking of field inventories of equipment and storehouse materials.

In this connection about \$700 worth of miscellaneous storehouse material was transferred to other projects the latter part of the month and it is expected to transfer about \$4,000 more as the demand arises, in order to reduce the stock of miscellaneous stores.

The operation and maintenance bills for water used during 1919 due March 1, 1920, were mailed out of the project office about the middle of January and at the

end of the month about \$4,000 of these bills had been collected. The work on the annual project history and operation and maintenance report was about completed towards the end of the month and the typewriting of the report started. Considerable work was also done on the water cards for the coming season.

The project manager and Assistant Engineer A. R. McGinness attended the Irrigation Institute at Bozeman from the 12th to the 17th. Assistant Engineer J. J. Hammond completed his work and was furloughed for three years effective beginning January 20, 1920, leaving the evening of January 19 for Billings, Mont., where he had accepted a position with the State Highway Commission.

Junior Clerk H. C. Bishop tendered his resignation on January 19, 1920, to take effect as soon after February 1 as practicable. He expects to engage in private business at Escondido, Calif., where he has acquired a small fruit and poultry farm.

Mr. Hough, examiner of accounts, visited the project January 5, 6, and 7.—*R. H. Fifield*.

#### MILK RIVER PROJECT, MONTANA.

The weather for the first 20 days of January was mild, with little snow on the ground, and fairly favorable for construction work. The balance of the month was marked by more severe weather and a heavy fall of snow.

Construction work was confined to repairs and improvements to the Dodson South Canal headworks, and to the addition of a second barrel to two of the flumes on the Dodson North Canal. Maintenance work was confined to wintering stock, minor repairs, and routine work in connection with the project history.—*Geo. E. Stratton*.

#### ST. MARY STORAGE UNIT.

January weather was about normal for this section. It is reported, however, that the snowfall in the St. Mary drainage basin has been somewhat below normal up to the present time.

The only field work by Government forces consisted of getting out a few fence posts for rebuilding pasture and field fences at the foot of St. Marys Lake, removing brush from the face of Sherburne Lakes Dam by the caretaker, and taking care of stock at winter quarters. The last car of steel for Spider Coulee flume was received at Cardston, Canada, and part of it hauled to the structure site by the freighting contractor.—*R. M. Snell*.

#### SUN RIVER PROJECT, MONTANA.

The first half of January continued mild and pleasant, the snow having practically all disappeared. Colder weather prevailed during the latter part of the month.

No construction work was in progress excepting that two men were employed during the early part of the month in placing foot plank, stop plank guides, and division box gates on the structures built during 1919 on the Greenfields Division.

On the Greenfields Division a considerable quantity of hay was shipped in for stock feed. Reports indicate that the winter grain was damaged by windstorms. No maintenance work was done. Gathering of data relative to crops and stock on the Greenfields Division was completed and the same data for the Fort Shaw Division are being tabulated. The operation and maintenance force was engaged on repairs to tele-

phone lines and assisted in moving the project office to Great Falls.

There were shipped from Fort Shaw and Simms 18 cars of hay, 4 cars of potatoes, 1 car of wheat, and 2 cars of cattle.—*G. O. Sanford.*

#### LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

January weather was generally mild, although a severe cold spell occurred during the third week and on the 24th of the month the temperature dropped to 37° below zero. The average for the month was 1° above normal. There was one severe storm during the month and the total snowfall amounted to 6 inches.

Dragline excavator No. 2 worked two shifts throughout the month, removing sand and gravel from the upper side of the canal to the lower bank. This work was from mile 19.3 to 19.6, or a distance of 1,500 feet; 5,520 yards of material were moved.

The men engaged in cutting willows and brush in the main canal completed the work on the 30th. During the winter willows and brush were removed on the upper portion of the main canal over a distance of 18 miles.—*L. H. Mitchell.*

#### Project weather during January, 1920.

Project.	Station.	Temperature, °F.			Precipitation (inches).
		Maximum.	Minimum.	Mean.	
Salt River.....	Phoenix, Ariz.....	79	29	53.3	1.42
Yuma.....	Yuma, Ariz.....	78	36	55.7	1.47
Orland.....	Orland, Calif.....	75	30	52.7	.14
Grand Valley.....	Grand Junction, Colo.....	43	-14	18.2	.66
Uncompahgre Valley.....	Montrose, Colo.....	43	0	21.2	.06
Boise.....	Boise, Idaho.....	56	8	30.2	.66
King Hill.....	Glenns Ferry, Idaho.....	60	3	29.7	.03
Minidoka.....	Burley, Idaho.....	61	-5	27.9	.80
Huntley.....	Ballantine.....	50	-26	23.4	.45
Milk River.....	Malta, Mont.....	47	-43	10.9	.95
St. Mary storage.....	Near Babb, Mont.....	53	-39	20	.86
North Platte.....	Fort Shaw, Mont.....	55	-29	23	.47
Lower Yellowstone.....	Savage, Mont.....	42	-37	11.9	.52
North Platte.....	Wyncote, Wyo.....	66	-17	29.6	.16
Newlands.....	Fallon, Nev.....	65	4	33.1	.30
Carlsbad.....	Carlsbad, N. Mex.....	75	10	42.3	1.15
Rio Grande.....	El Paso, Tex.....	68	20	44.5	1.06
North Dakota pump- ing.....	Williston, N. Dak.....	37	-37	21	.92
Umatilla.....	Hermiston, Oreg.....	57	8	30	1.24
Klamath.....	Klamath Falls, Oreg.....	58	12	33	.28
Belle Fourche.....	Orman, S. Dak.....	53	-17	22	.11
Strawberry Valley.....	Provo, Utah.....	60	-5	28.4	1.17
Okanogan.....	Omak, Wash.....	60	0	24.3	.13
Yakima.....					
Sunnyside unit.....	Sunnyside, Wash.....	62	8	29.7	1.00
Tieton unit.....	Cowiche, Wash.....	58	10	29.8	.77
Shoshone.....	Powell, Wyo.....	60	-7	20.6	.01
Indian projects:					
Blackfeet.....	Browning, Mont.....	48	-36	15.5	1.31
Flathead.....	St. Ignatius, Mont.....	54	28	10	1.36
Fort Peck.....	Poplar, Mont.....	34	-40	5.9	.18
Riverton.....	Pavillion, Wyo.....	76	-14	23.5	T.

#### NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

January weather was unusually mild and fair with the exception of a light snow on the 10th, followed by a short cold period. The mean temperature for the month was 5.5° above the average mean for the month of January. The precipitation was 0.15 inch.

**Operation.**—None of the canals were operated with the exception of the first 25.5 miles of the Fort Laramie Canal, which were operated to furnish water for the Lingle power plant. The ice breaking in the canal

caused a jam at the check at Mile 17.8, but no damage resulted. With this exception no difficulties were experienced.

**Maintenance.**—The operation and maintenance forces were reduced to a minimum and little work was done except general camp work and the necessary work on the operation of open drains. The construction of the dredge to be used in the enlargement of the Interstate Canal was completed and was tested and found to be satisfactory.

**Crops.**—There was very little crop movement during the month. The prices obtained remained steady with the exception of potatoes, which advanced from \$2.25 to \$4 per hundredweight, and wheat, which advanced from \$2 to \$2.20 per bushel.

**Live stock.**—There was little movement of live stock and the amount of stock now being fed on the project is the same as reported last month.

**Drainage.**—The construction of the Wild Horse Drain under cooperative contract with the Farmers' irrigation district, the Alliance irrigation district, and the city of Bayard was completed. The total cost of about \$74,000 is to be borne jointly by the interested parties. The drag lines on the Interstate unit were unable to work on account of the frozen ground.

On the Fort Laramie unit electric drag line No. 2 continued work on the Cherry Creek drain, operating with two shifts daily. A total of 31,084 cubic yards of material was moved and one mile of drain completed.

Three timber highway bridges were completed across this drain.

**Construction, storage unit.**—Work was continued on the installation of the plant required in the construction of the new North Tunnel outlet at the Pathfinder Dam. The boiler was freighted to the dam and was ready to place in position at the end of the month.

**Fort Laramie unit.**—Electric drag line No. 1 continued work on the main Springer lateral, operating with two shifts daily. During the month 1.21 miles of lateral were excavated and 30,050 cubic yards, class 1 and 900 cubic yards class 2 material moved. Drag line No. 5 continued work on the South Horse Creek lateral, operating with two shifts; 38,150 cubic yards of class 1 and 2,900 cubic yards of class 2 material were excavated. Drag line No. 3 completed its section of the Horse Creek lateral in December and was moved to station 4753+77 on the Fort Laramie Canal and started work on January 2, working westward toward the Nebraska-Wyoming State line. The canal section at that point has a base width of 30 feet and an average cut depth of 6.5 feet, with 2:1 side slopes. During the month this machine moved 37,345 cubic yards of class 1 and 10,156 cubic yards of class 2 material.

In removing classified materials on the drag-line work 2,223 linear feet of holes were drilled and 6,315 pounds of TNT and 107 pounds of dynamite were used.

Work was continued on the construction of the concrete structures on the Cherry Creek lateral system and 53 structures were completed.

The headgate for lateral 40.7 was completed and the headgate of lateral 41.8 begun.

**Northport District.**—Work was continued on the removal of classified material on the Northport Canal. Good progress was made on the construction of the Indian Creek Camp.

**Summary of electric drag line operation.**—Following is a summary of the results obtained in the operation of the four electric drag lines on the Fort Laramie unit:



	For month.	To date.
Number of eight-hour shifts .....	193	1,295
Miles excavated.		
Main canal .....	0.58	0.58
Laterals .....	1.97	23.48
Drain .....	1.00	6.86
Total .....	3.55	30.92
Total excavation, cubic yards .....	136,629	915,976
Class 2, excavation, cubic yards .....	13,956	77,891
Class 3, excavation, cubic yards .....	0	150
Average cubic yards per shift .....	708	707
Average kw.-h. per cubic yard .....	0.58	0.51

**Power house operations.**—The Lingle power plant was operated continuously throughout the month with three shifts daily. No operation troubles were experienced. The two motor-driven gate-lifting devices for the penstock and wasteway gates have been installed and are now in operation.

**Torrington lighting service.**—The delivery of power to the City of Torrington, Wyo., was continued satisfactorily, the average power consumed being 709 hw.-h. per 24-hour day.

**Surveys, Fort Laramie unit.**—Two survey parties were employed on the final location of the Fort Laramie Canal in Nebraska, irrigable area surveys in the second lateral district, and furnishing lines and grades for the drag line work.—*H. C. Stetson.*

#### NEWLANDS PROJECT, NEVADA.

Climatic conditions during January were favorable for project work, although frozen ground interfered somewhat.

On January 5 the project manager and district counsel attended a meeting of the board of directors of the irrigation district for the consideration of drainage and other project matters.

On January 6 to 8 District Counsel R. M. Patrick was in Reno on legal matters in connection with irrigation district.

On January 14 to 16 the project manager conferred with landowners in Upper Carson Valley and made an inspection of the proposed Spanish Springs Reservoir site near Reno, Nev.

January 15 was the date set for hearing the case of John E. Bennett *v.* United States before the Federal court at San Francisco. The case was continued to February 15.

On January 19 the project manager attended a meeting of the board of directors of the Truckee-Carson irrigation district for the consideration of drainage and other matters.

From January 24 to February 1 Examiner of Accounts A. H. Gullickson made a project inspection.

Owing to the illness of R. G. Withers, special assistant to the Attorney General, hearing of testimony in the Truckee River water-right adjudication case before the Federal court at Reno, Nevada, was discontinued on January 5 to be resumed March 1, 1920.

**Construction work and surveys.**—Reconstruction and extension of the "S" lateral system for delivery of water to the John W. Freeman Co., under vested water-right contract, was continued with dragline excavator No. 2 in operation on excavation work and with the installation of three minor timber structures. On January 30 bids were opened for the excavation of the Langford lateral and other ditches to replace the private ditches which must be moved in the con-

#### Crop report, North Platte (Interstate) project, Nebraska-Wyoming, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	33,446	Ton.....	70,109	2.1	\$15.00	\$1,051,635	\$31.44
Alfalfa seed.....		Bushel.....			20.00		
Sweet clover seed.....	387	do.....	717	1.9	18.00	12,906	33.35
Barley.....	3,720	do.....	101,067	27.2	1.25	126,334	33.96
Beans.....	95	do.....	747	8.0	3.00	2,241	23.59
Beets, sugar and tops.....	10,968	Ton.....	116,310	10.6	11.00	1,279,410	116.65
Beets, stock.....	29	do.....	384	13.3	6.00	2,304	79.45
Cane.....	181	do.....	326	1.8	4.00	1,304	7.20
Corn fodder.....	97	do.....	104	1.1	4.00	416	4.29
Corn.....	9,107	Bushel.....	157,699	17.3	1.30	205,009	22.51
Garden.....	270					13,130	48.63
Hay (other).....	616	Ton.....	647	1.0	10.00	6,470	10.50
Millet seed.....	289	Bushel.....	1,161	4.0	1.50	1,741	6.03
Oats.....	6,620	do.....	159,815	24.1	.80	127,852	19.31
Pasture (alfalfa).....	2,390	Acres.....			15.00	35,850	15.00
Pasture (sweet clover).....	361	do.....			15.00	5,415	15.00
Potatoes.....	6,284	Bushel.....	713,257	113.5	1.00	713,257	113.50
Rye.....	859	do.....	5,771	6.7	1.25	7,214	8.40
Wheat.....	9,757	do.....	165,536	17.0	1.90	314,518	32.24
Miscellaneous.....	214					9,730	45.47
Total.....	85,690						
Total and average.....						3,916,736	45.71
		Areas.			Acres.	Farms.	Per cent of project.
Alfalfa seeding with nurse crop.....	3,935	Total irrigable area farms reported.....			98,807	1,298	87
Alfalfa seeding without nurse crop.....	1,332	Total irrigated area farms reported.....			88,990	1,298	80
Fall wheat (1920).....	1,846	Under water-right applications.....			87,890	1,283	78
Fall rye (1920).....	122	Under rental contracts.....			1,100	15	1
Less duplicated areas.....	3,935	Cropped area farms reported.....			85,690	1,298	77
Less total other purposes.....	3,300						
Total irrigated.....	88,990						

struction of laterals to the Freeman ranch. Four schedules involving 10,422 cubic yards of excavation were covered by the advertisement issued January 24. Two proposals were received, one of which was rejected. Excavation of schedule 4 was awarded to A. Weishaupt, whose bid was 25 cent per cubic yard on 2,122 cubic yards.

One combined timber turnout and culvert was installed in the "S" line canal near Station 70±.

The project shops were operated during the month largely on tractor and dragline excavator repair work.

Drag line excavator No. 4 which had not been in use after completion of "T" line improvement work during October, 1919, was being moved to be operated on the construction of a drain into Carson Lake.

Irrigable area and farm unit surveys were made covering about 480 acres for the proposed placing of new lands on the farm unit plats.

Surveys were made as required in connection with the "S" lateral system extension and enlargement work.

Right of way descriptions covering land ownerships along the Truckee River below Lake Tahoe were prepared during the month.

*Settlement.*—Numerous prospective settlers visited the project during January.

Two homestead filings covering 153 acres and two private land water-right applications for 69 acres were accepted during the month.

Nine applicants also requested that 720 acres of new lands be placed upon the plats and deposited initial water-right payments to cover the same.

The Southern Pacific Co. has disposed of practically all of the desirable railroad lands on the project.

*Water supply and use.*—With only 33 inches of snow at Summit, Calif., the prospects of ample storage in Lake Tahoe are not bright. The surface of Lake Tahoe dropped 9.24 feet during January, the elevation of the same on January 31 being 6,225.07, which was the lowest, with the exception of the year 1913, during the past 20 years.

The storage in Lahontan Reservoir increased 12,600 acre-feet during the month, amounting to 169,880 acre-feet at the end of January.

All outlet gates at Lake Tahoe were opened wide on January 19 in an endeavor to maintain power rates in the Truckee River.

*Operation and maintenance.*—About 1,500 square yards of brush rip-rap were placed and 3,000 cubic yards of material were moved in strengthening the V Line Canal near the old Steam Shovel cut.

The U lateral was cleared of trees and brush over a length of 1½ miles.

One man and team were occupied during the whole month at Fernley repairing damage to laterals caused by the Truckee canal break which occurred December 10, 1919, and on miscellaneous maintenance work in the district. Two and one-half miles of laterals were cleared of trees in the Fernley district and 6 miles were cleared in the V and T districts. A small portion of the "Ky" lateral was cleared, using drag line excavator No. 3, which was being moved from the Truckee Canal near Lahontan to the Fallon district for maintenance work.

Repairs were made to seven bridges and about seven other minor timber structures.

Owing to the frozen condition of the ground practically no ditch cleaning work was done except that accomplished by drag line No. 3 on the "Ky" lateral.—*D. S. Sturser.*

#### CARLESEAD PROJECT, NEW MEXICO.

The weather was foggy and damp during a large portion of January.

No water was used for irrigation during the month. The maintenance work accomplished consisted of the continuation of the wire-bag work on the east embankment at Lake McMillan. This work was nearly completed on that portion of the embankment on which it appears absolutely necessary to afford protection this winter. The work of taking the crop

#### Crop report, North Platte (Fort Laramie) project, Nebraska-Wyoming, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	562	Ton.....	1,057	1.9	\$15.00	\$15,855	\$28.21
Barley.....	32	Bushel.....	326	10.2	1.25	408	12.73
Cane.....	28	Ton.....	57	2.0	4.00	228	8.14
Corn.....	286	Bushel.....	6,205	21.7	1.30	8,067	28.20
Corn fodder.....	10	Ton.....	5	.5	4.00	20	2.00
Garden.....	6					900	150.00
Hay (other).....	122	Ton.....	108	.9	10.00	1,080	8.85
Millet seed.....	4	Bushel.....	44	11	1.50	66	16.50
Oats.....	690	do.....	18,334	26.6	.80	14,667	21.26
Pasture (alfalfa).....	199	Acre.....			15.00	2,985	15.00
Potatoes.....	296	Bushel.....	19,770	66.8	1.00	19,770	66.79
Wheat.....	3,977	do.....	41,748	10.4	1.90	79,321	19.85
Miscellaneous.....	26	Acre.....					
Total cropped.....	6,258						
Total and average.....						143,367	22.91
			Areas.		Acres.	Farms.	Per cent of proj- ect.
			Irrigable area farms reported.....		7,327	62	7
			Irrigated area farms reported (under rental contracts).....		6,258	62	6
Total irrigated.....			Cropped area farms reported.....		6,258	62	6



census was completed at the end of the month. Two small gangs were employed cleaning ditches under the direction of special foremen. Repair work on the Black River supply ditch was started the latter part of the month, the work being in charge of one of the regular ditch riders.

The wire-bag work at Lake McMillan will be completed early in February. After the completion of this work, it is proposed to move the foreman on that job to Black River canal, where the concreting, for which money was supplied by the Pecos Water Users' Association, will be initiated. The work of cleaning laterals and canals and the installation of minor farm turn-outs will be in progress. We propose also to install a gaging station on the Pecos River below Malaga, the equipment for which will be supplied by the State engineer.

The run-off of the river at the Dayton station averaged about 800 acre-feet during the month. The total run-off amounted to 25,200 acre-feet. The reservoirs were both full at the end of the month. Water was spilled down the Pecos River during the entire month.

There seemed to be a large number of laborers around the project towns during the month, but owing to prosperity induced by high wages and money they made during the cotton-picking season, not many were willing to work. Most of the Mexican laborers were running out of grubstake at the end of the month, and a few were willing to work part of the time. There is a constant demand for higher wages by the Mexican laborers.

As during the preceding months of the winter, several farms were reported as changing hands. Purchasers were largely local men. A tendency has been to make more permanent improvements on the farms this year than at any time on the project. Eight or 10 tractors of the small type were purchased by project farmers during the period.

Work on the farms has consisted largely of cleaning up the cotton crop. Cotton picking during the month was largely snap cotton, which was a low grade, worth from 27 to 40 cents per pound. The total amount of cotton ginned at the end of the month was approximately 4,842 bales. The picking of the crop, with the exception of a few farms, was practically completed at the end of the month, and very little cotton remained in the gin yard to be ginned. Practically all buyers for the crop have left the project, and the later product generally is being shipped to the ports for sale. The better grades of cotton seed are worth about \$75 per ton, f. o. b. the project, except planting seed, which is worth from \$160 to \$200 per ton.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

Five Government excavators and one contract machine were in operation in the Mesilla Valley. One Monighan machine was operating in the Garfield Drain, and two Bucyrus machines in the El Paso Valley. About half the machines operated on a one-shift basis, proceeding with the construction work on drainage as in December. A total of 259,143 cubic yards were excavated in 5.4 miles of open drain. No new canals or laterals were constructed, but contractors completed the work of winter cleaning of canals and laterals. In the Mesilla Valley a number of old lateral structures were rebuilt and in the El Paso Valley surveys and plans were in progress for the improvement and extension of the lateral system. In both the Mesilla and the El Paso Valleys the field and office work on the irrigable area survey continued preparatory to the opening of certain areas to construction charges.

Both irrigation districts of the project, namely, the Elephant Butte Irrigation District and the El Paso County Water Improvement District No. 1, elected new officers in January. In the New Mexico District Mr. H. H. Brook, formerly County Farm Agent, was nominated and elected president. In the El Paso County District Mr. T. D. Porcher, a prosperous farmer of the El Paso Valley, was nominated and elected president. The new board of directors of the Elephant Butte Irrigation District is practically the same as for the preceding year. The El Paso County District election for board of directors resulted in almost a complete change of members. Mr. J. A. Smith, connected with the irrigation movement of the project for the past 18 years, retired as president to devote more time to his personal business.

On Saturday, January 24, there was held in El Paso the Annual Conference of the Operation and Maintenance Employees of the Rio Grande project. The El Paso Chamber of Commerce kindly placed at the disposal of the Reclamation Service the use of its meeting room. Approximately 50 employees of the irrigation department were present. Besides discussions of their work by the project manager and irrigation superintendent, informal talks were made by Judge A. S. Eylar, past president of the Elephant Butte Irrigation District, T. M. McKamy, president of the Dona Ana County Farm Bureau, J. A. Smith, Governor Evans, and Roland Harwell.

The unusual warm weather during January was favorable for the exceptional growth of winter wheat, and a good yield is anticipated. In many places the buds on the fruit trees are about ready to burst. The ground is now being plowed and prepared for other crops. Cotton seed is being distributed through the El Paso and Dona Ana County Farm Bureaus at cost.

The Mesilla Valley Poultry Association marketed \$1,000 worth of eggs during January.

In the Mesilla Valley tap boxes and checks are being placed by the construction department. This work is being done by the operation and maintenance department in the El Paso and Rincon Valleys. Four thousand feet of brush riprap have been placed in the Montoya Canal, and weirs are being placed at the ends of all wasteways.

The project manager discussed with the directors of both irrigation districts the proposed plans for opening of certain project lands during the season of 1920. The lands embraced in the proposed opening are those to which drainage and irrigation facilities have been provided and which are in good condition to produce paying crops.—*L. M. Lawson.*

#### NORTH DAKOTA PUMPING PROJECT.

January weather conditions were satisfactory for the work in hand, although no construction or field work could have been done. A good fall of snow remained on the ground and kept the roads in fit condition for runners, all traffic being on runners.

Maintenance work was limited to machinery and boiler repairs in the power plant and to necessary inside maintenance in the coal mine.

The power plant was operated for the commercial power contract; 106,600 kilowatt hours of electrical energy were delivered to the city of Williston. This was a decrease of 8,787 kilowatt hours below last month, and 223 kilowatt hours below the same month last year. The falling off below a year ago was due to the adoption of union hours of closing in the stores in Williston, the conditions otherwise being essentially the same as last year.

Nine hundred and fifty-five tons of coal were mined.

On January 28 an all-day meeting of the farmers in the Williston irrigation district was held at Williston. Lunch was served at noon. The object was to give all landowners and users of water an opportunity for free discussion of the operations of the past season, and all persons were particularly advised and urged to freely criticize the work and results of the season of 1919. The meeting took a surprising development into a harmonious get-together which was good for everybody.—*Wm. S. Arthur.*

#### UMATILLA PROJECT, OREGON.

January weather conditions were on the whole normal. Snow remained on the ground until the 15th, and the frost was not out of the ground at the close of the month. Maximum and minimum temperatures of 57° and 8°, respectively, are somewhat misleading when the mean temperature for the month is shown to be 29.95°. Only on six days was a minimum temperature higher than freezing recorded. The precipitation totaled 1.24 inches and 4 inches of snow fell. The wind movement was low, totaling 3,235 miles.

*Farming operations.*—Weather conditions have limited farming operations materially. A little hay was baled and hauled and some land leveling done the latter part of the month.

*Labor conditions.*—Labor conditions were easy as very little work was attempted during the month.

*Operation and maintenance.*—The feed canal was operated throughout the month. Diversions for storage were resumed on the 31st. A head of 35 second-feet was delivered continuously to the Echo Flouring Mills. On the 15th and 16th a second flood entered the feed canal from Stage Gulch. Practically no additional damage was done to the canal over that suffered from the December flood. However, the railroad company and one land owner below the large break in the feed canal suffered additional damage and inconvenience. Repairs to the feed canal were effected the last of the month. They were difficult and expensive due to deep frost in the ground. It was not advisable to operate the canal during the month because of heavy ice jams. When the water was started on the 31st considerable ice still lay in the lower end of the canal. When the water reached this it floated and jammed on the concrete bridge near the end. A crew of men with pike staffs and dynamite worked a great part of one night, successfully relieving the canal which was seriously endangered for several hours. It was also necessary to dynamite a jam at the bridge south of Hermiston as the ice and current had torn out about 20 lineal feet of side lining and were rapidly taking out the bank.

Sluicing operations were begun on the 17th by the operation of two gates. The first material to be taken out lies in the canal along the east side of Juniper Canyon. Fair progress was made, but operations were difficult because of the heavy deposit of sand and unfavorable weather.

Maintenance work was limited to repairs to the feed canal breaks and cutting willows and locusts along distribution canals.

No construction work was performed during the month.

The chief matter of interest on the project during the month was the epidemic of influenza. It is estimated that there were at the close of the month 200 cases on the project.

A. H. Gullickson, examiner of accounts, visited the project January 5 to 7.—*H. M. Schilling.*

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

January was favorable for out-door work such as repairs to flumes, but it was too cold to allow any considerable working of the soil.

Labor conditions continue about the same. Men are not plentiful; wages vary from \$4.50 to \$5 per day. Two crews, consisting of a foreman and eight men in each crew, have been employed the greater part of the month in repairing the long timber flume on Canal "C." The work consisted in replacing posts and stringers which have become rotten, also patching and replacing a false bottom in the waterway. Another crew of three men was employed the last 10 days on repairs to the timber flume on the Nuss Lake lateral.

On January 13 various irrigation districts had their annual election of officers. Since the election the directors of the Malin and Shasta View irrigation districts have gone on record as being agreeable to having the construction charge based on the average cost of construction to the various proposed pumping districts. The electors within the Enterprise irrigation district authorized the directors of the district to enter into a contract with the United States for the purchase of a water right.

A. H. Gullickson, examiner of accounts, made an inspection of the project books January 10 to 20. —*Herbert D. Newell.*

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

January weather was mild, on the whole. Roads were rough but not impassable. One week of below-zero weather nights occurred around the 20th to 26th.

The Inlet Canal was operated all month diverting the total flow of the Belle Fourche River—about 13,000 acre-feet—into the reservoir. No difficulty was experienced with ice in keeping the canal open. Storage in Belle Fourche Reservoir now amounts to 113,150 acre-feet, which insures an adequate supply of water for the season.

Work was begun with a small party in repairing structures and establishing a new grade line for the Indian Creek flume. At Orman the substructure was framed for the Brandsberg flume and the ice house was filled for camp use.

Two four-ups were started to hauling sand for the manufacture of concrete pipe for Townsite lateral siphon.

Material for the annual operation and maintenance report was collected and compiled and work on the report begun.

F. G. Hough, inspector of accounts, and his assistant, William E. Sha, visited the project. Mr. Hough arrived on the 10th of January and left on the 22d. Mr. Sha preceded Mr. Hough by 5 days and was still on the project at the close of the month. He has been ill for about 10 days.

While on the project Mr. Hough made a careful inspection of office methods and accounts and left apparently satisfied with results.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

Considerable snow fell during January and the weather was generally cold. As the weather conditions were unfavorable for both farming and construction work, labor and teams were plentiful.

A carload of steel forms for making concrete pipe was loaded and shipped to the Belle Fourche project



and orders were placed for machinery and equipment for use in making repairs at the Strawberry Tunnel.

A report on the extension of the project to cover land in Juab County was practically completed and will be submitted shortly. The compilation of the 1919 crop census was completed and the results were forwarded to Washington.

A form of contract providing for the lease of the project grazing lands to the water users at the termination of the present lease was drawn up and submitted to the water users and the present lessees for consideration.

The Springville Irrigation District is increasing the area covered by that district and will purchase additional water from the project as soon as the quantity needed is ascertained.

A number of meetings, attended by District Counsel E. W. Burr and J. R. Alexander, were held on the project to discuss the details of the formation of irrigation districts.

The power plant was operated without interruption, and electrical energy furnished to the towns of Payson, Salem, Spanish Fork, and Springville.

The Spanish Fork sugar factory ceased operations on January 28 after operating with three shifts through a campaign lasting 108 days.

Water-right applications were received from the different units on the project, and a number of water users called at the project office to make preparations for buying water.

Influenza broke out in several of the towns on the project about January 20 and by the end of the month a great many cases had developed. In one of the towns the schools were closed and all public meetings prohibited for the present.—*J. L. Lytel.*

#### OKANOGAN PROJECT, WASHINGTON.

For practically the entire month of January cold weather prevailed, but at no time was it extremely cold. The precipitation on the project lands amounted to 0.13 inch, which is believed to be the driest January on record. The shipping of apples again engaged the attention of the shipping agencies and the organizations of the project farmers, as the embargo remained raised during the month. Considerable of the apple crop was, however, still in storage at the end of January. Prices on the later varieties of apples dropped some, with no buyers, and for the early varieties still being marketed, prices were quite low. Alfalfa remained at \$25 per ton in the stack. The regular routine office work was carried on during the month. The crop report was finished in the field and tabulated. Other tabulations were also gotten out in connection with the project annual history and operation and maintenance report.—*Calvin Casteel.*

#### SALMON LAKE DAM.

The weather for January was characterized by moderate temperatures and practically no precipitation. Even on the higher mountains the accumulated snowfall of the winter is very light.

Although the weather was mild for this season of the year very little work was practicable. At Conconully Dam 814 feet of 12-inch tile drain were placed in trench at the downstream toe of the dam and 3,172 cubic yards of gravel were placed on the apron at the toe of the dam. At Salmon Lake Dam operations were confined to the repair of construction equipment and the cutting of wood fuel for next season's operations.

#### Crop report, Okanogan project, Washington, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.		Per unit of yield.	Values.	
			Total.	Average per acre.		Total.	Per acre.
Alfalfa.....	1,462	Ton.....	2,552	1.75	\$25.00	\$63,800	\$43.64
Apples.....	4,164	Pound.....	32,301,640	7,757.36	.05½	1,816,967	436.35
Corn.....	21	Bushel.....	610	29	1.20	732	34.86
Corn fodder.....	44	Ton.....	74	1.7	10.00	740	16.82
Small fruit.....	27½	Pound.....	128,605	4,719.4	.04½	5,787	212.38
Garden.....	96½	Acre.....				16,115	167.43
Hay.....	171½	Ton.....	208	1.2	30.00	6,240	36.33
Onions.....	½	Pound.....	1,000	4,000	.05	50	200.00
Pasture.....	64	Acre.....			10.00	640	10.00
Peaches.....	37	Pound.....	172,000	4,648.6	.04	6,880	185.94
Pears.....	32½	do.....	185,500	5,664	.03	5,565	169.93
Prunes.....	3	do.....	4,000	1,333.3	.05	200	66.67
Potatoes.....	17½	do.....	129,800	7,470.5	.03½	4,543	261.40
Miscellaneous.....	100½	do.....	580,400			23,216	230.43
Less duplicated areas.....	927½						
Cropped.....	5,314						
Total and average.....						1,951,475	367.23
		Areas.		Acres.	Farms.	Per cent of proj- ect.	
Nonbearing orchard.....	449½	Total irrigable area farms reported.....		6,874	407	68.5	
Young alfalfa.....	47½	Total irrigated area farms reported.....		5,849	407	57.9	
Area irrigated, no crop.....	38	Under water-right applications.....		4,468	367	44.2	
Less duplicated areas.....		Vested water rights.....		1,381	40	13.7	
Total, other purposes.....	535	Total cropped area farms reported.....		5,314	407	52.6	
Total irrigated.....	5,849						

A steam shovel was operated the full month on the excavation of a road around the north and west sides of Salmon Lake. During the month 3,450 feet of side hill road were completed.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for January was somewhat below normal, the average being the lowest for January since 1916. Precipitation was less than normal. On the Sunnyside unit there were 1 inch of rainfall and 7.2 inches of snow. On the Tieton unit there were 6 inches of snow, 1 inch remaining on the ground at the close of the month. Snow conditions at the various reservoirs at the end of the month were as follows: Keechelus, 16 inches; Kachess, 15 inches; Cle Elum, 13 inches; Bumping, 7 inches.

*Operation and maintenance.*—Weather conditions were unfavorable for work on the canals. On the Sunnyside unit gravel was hauled for riprap, and some progress was made on cleaning and painting metal structures, clearing weeds from canal right of way, and repair of wasteway and other structures. Overhauling of the several pumping plants was continued, some of this work being held up awaiting arrival of repair parts.

On the Tieton unit maintenance work consisted of repairing and rebuilding fences, resetting telephone poles, cutting and grubbing willows on main and sublaterals, and installation of wood-stave pipe to replace wooden flume and concrete pipe. From the 18th to the 21st about 75 second-feet of water were put through the canal for the purpose of filling cisterns, which could not be filled during previous runs on account of difficulty with ice and slush.

*Kennewick unit.*—Preparation of plans was under way, consisting of design of structures for power and main canals.—*R. K. Tiffany.*

#### SHOSHONE PROJECT, WYOMING.

Mild temperatures prevailed in January, with the exception of the 22d, on which date the temperature dropped to  $-7^{\circ}$ . A light fall of snow on the 20th measured 0.01-inch precipitation. The roads were in fair condition, due to the light precipitation, and good progress was made in hauling hay and grain to the local markets and shipping points.

*Water supply.*—The surface of the reservoir dropped 3.8 feet during the month. The outflow measured 31,621 acre-feet. There was considerable thawing of snow drifts in the valleys, but none of the mountain snows have melted.

*Operation and maintenance.*—The principal maintenance work in the Garland Division was loading 68 cubic yards of rock at Corbett and shipping it to O'Donnell siding for paving below the drops in the main canal. Willow roots were removed along 270 feet of clogged drain K-1. In the Frannie Division 152 cubic yards of rock riprap were placed on the Deaver Reservoir dike covering about 500 square yards. Several leaks were repaired in the Deaver water works pipe line. Fifty-eight tons of ice were harvested and stored. Only about 3 per cent of the maintenance work outlined for this spring has been completed, and about 40 per cent of the maintenance work to be completed last fall is yet to be finished, due to the early closing of winter. Weather conditions permitting, maintenance work will be pushed to the limit to get the system in readiness for the coming irrigation season.

*Construction.*—The only construction work in progress on the project was in the Frannie Division and consisted of moving scrap lumber and surplus reinforcing steel from the dismantled Loop Camp and unloading shipments of lumber for lateral system structures. This work was done by the watchman at the Frannie Camp. One contractor working in a heavy cut on schedule 10 in Frannie Canal extension in the third unit moved 1,875 cubic yards of class 1 and 168 cubic yards of class 2 material.

*Drainage.*—The Bucyrus dragline was transferred to the Frannie Division January 29 for the excavation of the Howell drain. Shop crews are engaged on repairs to the Lidgerwood drag line and Austin trencher to put them in readiness for the season of 1920. A tentative system of drains has been planned for the North Garland and Dry Lake areas to be constructed in 1920.

*Field and office engineering.*—The office engineering forces in the Powell and Deaver offices were engaged on miscellaneous drawings, preparation of general map of the project, 1919 project history, and right of way for laterals in the Frannie Division through private land. Some work was accomplished on determination of irrigable areas of farm units in the first and second units of the Willwood Division.

Engineer Ferd Bonstedt continued the reconnaissance work of the Clark's Fork project the last week in December, remaining at Red Lodge, Mont., for the purpose of examination of county records for completing report of water appropriation of which beneficial use has been made for all the streams in Carbon County. He returned to Powell January 7.

*Settlement.*—Public notice and farm unit plats have been completed and approved by the department for the opening to entry of 62 farm units containing about 4,500 acres of land in the third unit of the Frannie Division, which will be the eighth unit of the project. This opening will take place March 13, 1920.

*Water users' association.*—At the annual meeting of the water users' association held at Powell January 20, the following officers were elected to serve for the ensuing year: Walter F. Brown, president; E. A. Morgan, secretary; R. A. Anderson, Frank G. Hart, Max Addleman, William E. Wales, and Clay Cherry, directors.—*A. H. Ayers.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

January weather was about average for this section. Part of the month was very cold but not exceptionally so and the precipitation was about normal.

There was no field work of any kind. There were no field employees and the time of the office force was divided between the Blackfeet project and the St. Mary storage unit.

Some wheat was hauled to market by the farmers, but the only other farm work consisted of feeding stock.—*R. M. Snell.*

##### FLATHEAD PROJECT, MONTANA.

January weather, especially the latter part of the month, was mild. The total snowfall for the month was 6.5 inches, most of which has gone into the ground. Winter wheat is in good shape but in danger due to lack of snow cover. Muddy roads have made travel about the project difficult.

At McDonald Lake Dam 8,400 cubic yards of riprap were placed. With the exception of some spreading of

(Continued on page 150.)



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.*

HUGH A. BROWN, EDITOR.

### Monthly Progress Reports.

(Continued from page 149.)

this riprap the dam is now complete except for the spillway. Excavation will be started for the spillway the first of February.

The only other construction work was on the Polson A lateral. The work done here consisted of 3,300 cubic yards lateral excavation, class 1, 1,100 cubic yards of which were wet. The balance was steep side-hill. Two hundred and ten cubic yards of structure excavation were also completed.

Irrigable area surveys have been carried on by two parties, one working in Horte Division and one in Post Division. A small amount of work on irrigable area surveys was done in Camas Division.

No trouble is being experienced in securing sufficient labor for the work now in progress.—*W. C. Christopher.*

#### PORT PECK INDIAN PROJECT, MONTANA.

The weather for January was about normal for this locality. There was more snowfall than usual and it was necessary to feed the range stock the greater part of the month.

No construction work was in progress.

The engineering section was employed on estimates and designs for structures for Big Muddy unit and on the estimate for Canal "A" of the Poplar River unit. The clerical force was engaged on the monthly accounts and the preparation of the project history.

On January 26 a meeting was held at Poplar at which Sam Teagarden, secretary of the Montana Irrigation Congress, gave a talk on the needs of irrigation in Montana. Walter Matthews, of the State Highway Commission, outlined the work for the coming year of the Highway Commission.—*R. M. Conner.*

#### RIVERTON PROJECT, WYOMING.

January weather was mild. Most of the snow melted and there was little precipitation. The roads were fair for this time of the year.

The first drag line began excavation on the Wyoming Canal on January 19 and the second on January 22. The machines are both working on a steep side hill at about mile 4½, and the material moved is largely a heavy coarse gravel with cobbles. These machines have worked one shift each. The total excavation during the month was about 6,000 cubic yards, all class 1. The building of the construction camp has been continued.

A considerable quantity of construction materials and supplies has been received at Riverton. Topographic surveys have been continued by two field parties. Progress has been rather slow owing to the distance from headquarters and the short days.—*H. D. Comstock.*

#### GENERAL OFFICES.

*Washington office.*—The director was in charge of the office during January, with the exception of the week of January 18 when he was in New York on official business and attending the meetings of the American Society of Civil Engineers, of which he was elected president. On January 5 he addressed the Philadelphia Society of the American Society of Civil Engineers. During his absence Mr. Bien was acting director.

Judge King was in the office during the month.

Mr. Henny and Dr. Mead arrived on January 18 and were in New York and in the Washington office for several days.

Mr. Weymouth arrived on the 10th, returning to Denver on the 26th.

On January 12 a hearing was held before Secretary Lane in connection with the leases of Upper Klamath Lake marsh lands.

Among the visitors during the month were the following: Messrs. Nelson, Kibby, Shaw, and McPherin in behalf of the development of Imperial Valley by the construction of the All-American Canal; Messrs. Craft and Magruder of the Farmers' Irrigation District, Nebraska; Messrs. Taylor and Rossborough of the California-Oregon Power Co., in connection with the leases of Upper Klamath Lake marsh lands; Mr. Giltman, Billings, Mont.; Mr. Clarke, of Arizona; Mr. McCormick, vice president of the Southern Pacific Railroad; E. J. Mehren, editor of Engineering News-Record; F. A. Kern, Ellensburg, Wash., secretary of the Kittitas Irrigation District; Messrs. Perrine and Hollister, Idaho; Vicente Mills, chief supervising surveyor of the Bureau of Lands, Philippine Islands; James R. Garfield, former Secretary of the Interior; Judge W. T. Potter, chairman of the Board of Water Engineers of Texas; W. K. Brown, San Francisco, Calif.; and Mr. Dangberg, Minden, Nev., president of Upper Carson Irrigation District.

*Denver office.*—The chief of construction returned from Idaho on January 1. He left for Washington, D. C., on January 7, returning on the 29th. Assistant Chief of Construction R. F. Walter was in the Denver office during the entire month. Assistant Chief of Construction Charles P. Williams left on January 11 to attend a conference of project managers from the States of Montana, Wyoming, and North Dakota, at Bozeman, returning on the 19th. At the same time there was held at Bozeman the Montana Irrigation and Drainage Institute. Official visitors included Project Manager R. K. Tiffany and Mr. George A. Hammond.—*F. E. Weymouth.*

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

HON. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSONG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN W. HALLOWELL, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.  
 ARTHUR POWELL DAVIS, Director and Chief Engineer of the Reclamation Service.  
 WILL R. KING, Chief Counsel of the Reclamation Service.  
 CLAY TALLMAN, Commissioner of the General Land Office.  
 CATO SELLS, Commissioner of Indian Affairs.  
 GAYLORD M. SALTZGABER, Commissioner of Pensions.  
 JAMES T. NEWTON, Commissioner of Patents.  
 PHILANDER P. CLAXTON, Commissioner of Education.  
 GEORGE OTIS SMITH, Director of the Geological Survey.  
 VAN H. MANNING, Director of the Bureau of Mines.  
 STEPHEN T. MATHEE, Director of the National Park Service.  
 COL. F. MEARS, Chairman Alaskan Engineering Commission.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Office of the director and chief engineer: Morris Bien, assistant to the director; J. B. Beadle, secretary to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor Reclamation Record; E. C. Bebb and C. A. Bissell, engineers; J. H. Pellen, chief draftsman; F. L. Cavis, chief accountant; A. H. Gullickson, western district, Yakima, Wash.; C. E. Platt, southern district, Denver, Colo.; F. G. Hough, northern district, Helena, Mont., examiners of accounts; C. A. Lyman, chief of repayment accounts section; C. E. Harris, auditor of transportation accounts; Mrs. J. T. Davis, chief of auditing section; Miss H. A. Fellows, fiscal agent; C. H. Fitch, chief clerk; C. N. McCulloch, chief of mails and files section; Emmet Carr, purchasing agent; T. E. Brown, chief of stenographic section; G. W. Numbers, appointment clerk.

Office of the assistant to the director: D. H. Sibbett, J. E. Golladay, and A. G. Pollock, counsel; Mrs. G. B. Mathiot and Alfred Dresser, assistant counsel; Mrs. E. W. Ballard, C. E. Womersley, and D. S. Koontz, clerks.

Office of the chief counsel: Ottamar Hamels, assistant to the chief counsel; Geo. A. Ward and E. W. R. Ewing, counsel.

## DENVER OFFICE.

F. E. Weymouth, chief of construction, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chiefs of construction; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; E. A. Moritz, office engineer; J. L. Burkholder, drainage engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; S. E. Hedden, disbursing officer.

## FIELD OFFICES OF CHIEF COUNSEL.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Denver, Colo.**—Law section office of chief of construction: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel. Office of irrigation district organization: E. W. Burr, district counsel; also in charge North Platte and Belle Fourche Project.

**El Paso, Tex.**—P. W. Dent, district counsel; T. F. Fly, assistant district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleson, district counsel, Helena, Mont. Projects: Black feet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—O. P. Morton and R. J. Coffey, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise Idaho; E. R. Mills, chief clerk; C. F. Weinkauf, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Ballantine, Mont.; G. H. Bolt, chief clerk and fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; C. C. Hogue, chief clerk; E. V. Hillius, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont. E. E. Chabot, chief clerk; J. A. Keever, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melass, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; J. R. Ummel, chief clerk; O. K. Barnes, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Brownsv., Mont.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, project manager, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; C. E. Brodie, fiscal agent.

**Strawberry Valley Project.**—J. L. Lytel, project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; L. H. Kline, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—F. D. Pyle, project manager, Montrose, Colo.; A. H. Peach, chief clerk; C. B. Funk, fiscal agent.

**Yakima Project.**—R. K. Tiffany, project manager, Yakima, Wash.; C. E. Crowmover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppeimann, chief clerk; E. M. Philbaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

**Flathead Project.**—E. A. Moritz, project manager, St. Ignatus, Mont.; C. J. Moody, engineer; R. V. Sass, superintendent of construction; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk and fiscal agent.







# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

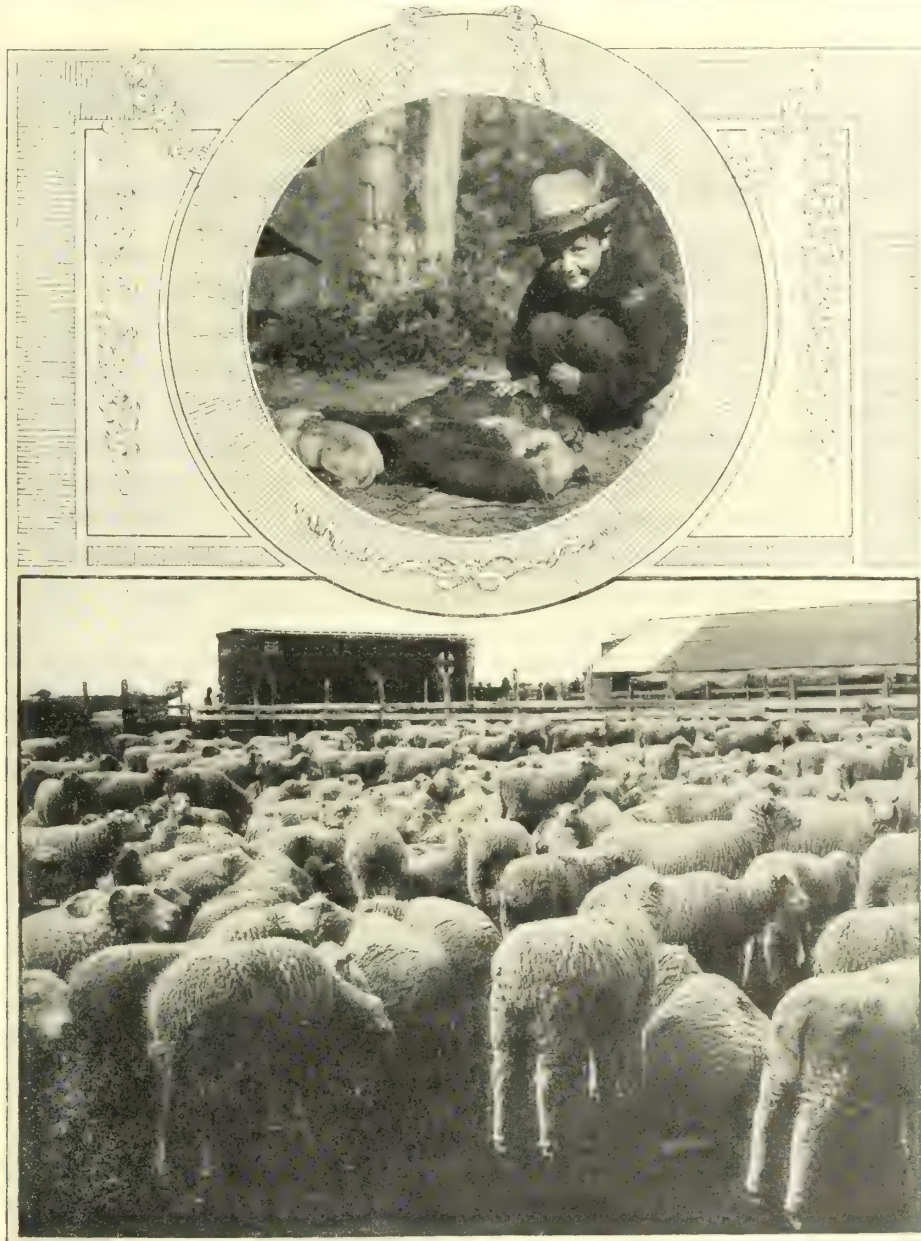
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VOLUME 11, No. 4

PRICE (NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

APRIL, 1920





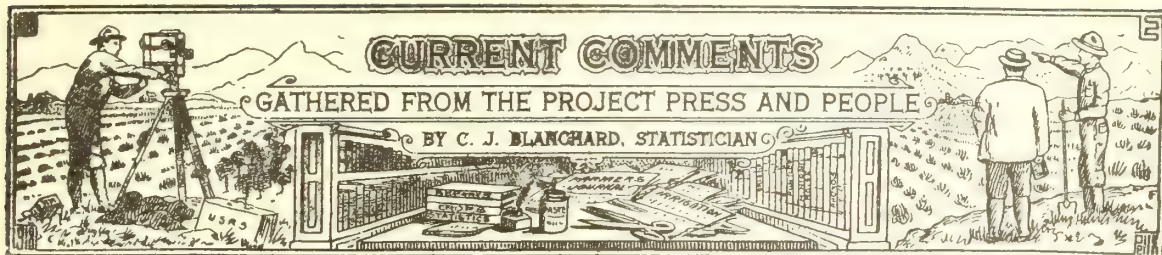
HON. JOHN BARTON PAYNE, SECRETARY OF THE INTERIOR.

Hon. John Barton Payne, who recently assumed the duties of Secretary of the Interior, was born in Pruntytown, Va., January 26, 1855.

Judge Payne was admitted to the bar in 1876, practicing at Kingwood, W. Va. In 1880 he was appointed special judge of the Circuit Court of Tucker County, W. Va. Later he practiced law in Chicago, and was appointed judge of the Superior Court of Cook County, Ill., in 1893, resigning in 1898. He was the senior member of the firm of Winston, Payne, Strawn & Shaw, of Chicago, until January 1, 1918. Judge Payne's next public work was as general counsel of the United States Shipping Board, of which he later became chairman, and general counsel to the Director General of Railroads.

Judge Payne has for years been a patron of art. He is a member of numerous clubs in Washington and Chicago.

The employees of the Department of the Interior welcome him as the new head of this great department.



The Settlement Section extends its congratulations to the project manager of the North Platte project and his efficient corps of workers upon the very satisfactory manner in which the opening of 79 farms on March 5 was conducted. It is only necessary to report that for these 79 farms there were 3,296 soldier applicants, thus necessitating a separate drawing for each farm. More than a fourth of the applicants were present in person, which means that 824 strangers were in the little town of Torrington, Wyo., where the filings were received.

In order that there should be no complaint of delay the Service officials stayed on the job night and day until the winners had been notified and the checks of those who were unsuccessful had been returned. Only those who have had charge of similar affairs can appreciate the arduous work involved in such a land opening as this. When the last detail had been finished the project folks were all in and the formal report was postponed until the overworked bunch are physically able to write it up. Meanwhile we are pleased to record another successful opening and the addition of 79 new farmers to our already large family. To the chaps who served their country in war, and who now are preparing to serve it again in peace by augmenting our food supply, we extend our greetings and best wishes. No mistake was made when you selected the valley of the North Platte for your new home. If you desire confirmation of this fact ask any old timer from Guernsey to Bridgeport.

The big regret about this opening is that 3,217 heroes who wanted farms and were willing to pay for them could not be accommodated. Evidence, if any is needed, of the sincerity of purpose of those 5,000 or more who wrote the Washington office for details is found in the fact that 3,296 applications, each of which was accompanied by a deposit ranging from \$240 to \$480 were received at Torrington. As many as 200 applications for a single farm were filed. More than 800 of these applicants appeared in person at the drawing. The total expense of the trip must have been enormous, probably \$150,000 were spent by the soldiers, and only 79 of them have anything to show for their investment. It is conservative to state that an average of \$2,000 has been spent in railroad fares, hotels, and other expenses for each of the farms opened, and of course mostly

by those who got only their experience out of the investment.

The opening at Powell of 55 farms on March 13 was simply a repetition of that at Torrington. Here, too, all the details were carefully planned and everything passed off without a hitch. The annual openings of small blocks of land on the Shoshone have given the Service experience, and the drawings are conducted smoothly and speedily. The number of applications were 546 and drawings were held for each of the 55 units.

The Settlement Section for the first time in 60 days is taking a long breath. Literally we have been snowed under by the avalanche of soldier letters concerning these two openings. The large number of visitors seeking similar information consumed a lot of time. Everybody has worked at high pressure and it is a relief to feel that for the time being we are to have a let up, as there are no more openings until next fall.

In the interim Congress may find a way to satisfy the real hunger for homes on the part of those who have worn the uniform of the United States.

Idaho and Utah beet sugar growers apparently are planning to chop off a slice of the sugar factory profits by means of sliding scale contract which provides a minimum of \$12 per ton price for 1920 beets, and \$1.50 per ton increase for every cent increase in the price of sugar above 8 cents per pound at seaboard during the year. If this plan means the assurance of 8-cent sugar at seaboard we don't care how much the beet grower gets from the factory. If \$12 a ton for beets means a lot more sugar and a wholesale price of 8 cents we are for it strongly.

Under the heading "Watch Your Step," Maj. Reed, executive secretary of the Idaho Reclamation Association, has issued a strong and convincing appeal to the citizens of the valleys of southern Idaho to enroll under the banners of the organization and make a pull altogether for a broad, comprehensive campaign of irrigation development. The association, with a membership of 14,000, and a popular purpose in view, is growing. Maj. Reed says:

Idaho has the land and water, the big problem is to get them together working for production. The writer does not feel that it makes a great deal of difference just how the



money is secured to create this period of construction, so long as all is fairly and honestly done and everybody connected with the transaction is amply secured and protected. The mistakes of the Carey Act in Idaho will never be repeated.

The U. S. Reclamation Service has done splendid work and is entitled to credit and due consideration. \* \* \* It is possible that a deal may be brought about in which the Government, the State, and private capital can all work together.

*Arizona, Salt River project.*—A syndicate of well-known business men have bought the A. J. Peters ranch west of Chandler, paying \$250,000 for it, a large part of the purchase price being paid over in cash when the deal was made. Those who form the syndicate are Leo Goldman, Charles Korrick, C. R. Greene, Geo. P. Bullard, Frank Cresswell, and Leon S. Jacobs. They will put the entire 800 acres in cotton.

For the fourth time in the history of the project the great Roosevelt Reservoir is filled to overflowing and is now pouring its surplus over the big spillways into the river 220 feet below. Enough water to cover Delaware a foot deep is now safely impounded and will be released next summer as needed to irrigate 220,000 acres of America's richest land. A harvest valued at two times the entire investment of the Government is guaranteed for 1920. Is Federal reclamation a success?

Partakers recently of Chandler's hospitality were members of Cleveland's Chamber of Commerce, who had just completed an inspection of the Roosevelt Dam. One of the Buckeye folks, holding aloft a fat sandwich in one hand and a big slice of pie in another, remarked:

We came from the Grand Canyon, and left there with the opinion that we had witnessed the most wonderful sight of our trip. We have just left the Roosevelt Dam and must say that we are compelled to change our minds, as the big reservoir is the most wonderful thing we have seen. When we realize that this spot we are now standing on was desert eight years ago, it can truly be said that a wonderful work has been wrought by the mighty Roosevelt Dam.

A new scenario of Salt River Valley is assured, thanks to the cooperation of the Water Users' Association. We are making plans to put over the snappiest movie story of our modern Garden of Allah, and are thankful indeed that the opportunity is ours to bring our pictures up to date.

In 1914 a similar contribution enabled us to film the valley, and our reels were among the best shown at San Francisco's great exposition. Since that time they have been shown all over the world, Siberia and Australia not excepted.

*California, Orland project.*—Glimpses of Orland project in the movies were granted three large audiences in New York City in February. The almond orchard scenes made a decided hit, as the effete East really didn't know whether almonds grew on bushes or on trees. Stony Creek Reservoir and the spillways discharging the excess water are very striking pictures, and the various crops and dairy scenes are equally attractive. We are going to try and bring our films

up to date. A lot of changes have taken place since 1914, when our pictures were made.

More orchard trees will be planted in the Orland section the present year, according to County Horticulturists Wrenn and Kingwill, who have been busy inspecting the incoming trees, than have been planted in any one year since trees were first found to be a possibility in this section of the country. The two experts are being kept busy almost day and night inspecting the nursery stock which is being shipped in for planting.

Almonds head the list in point of numbers, there being more almond trees on the eve of planting than of any other variety of orchard stock. There will be a large acreage of this variety planted. Prunes come second, this variety of fruit having been proved to be one of the best paying varieties of trees to be grown in this vicinity. Orland is destined to become the center of one of the most important fruit districts of California, and the present year planting points to an early realization of this condition.

Cotton bids fair to outrival rice in the valley as a quick money maker, if the experience of William Foster, local farmer, can be taken as a criterion. Foster, who owns a farm east of town near the creek, will clear over \$850 from 3 acres of cotton which he put in last year as an experiment.

From the 3 acres he harvested 4,500 pounds of cotton and seed, about 1,500 pounds of clear cotton, and 3,000 pounds of seed. The cotton he sold for 50 cents a pound, netting \$750, and the seed for \$70 a ton, bringing \$105 approximately. This makes a total of \$855 for the 3 acres.

Rice at the present prices would probably top this figure of \$285 an acre, but rice expense is considerably more than cotton.

Foster intends to ship his cotton to the Fresno country to the cotton gin there, as the one at Durham was put out of business this year by the rice fever.

A movement is on foot looking toward the enlargement of the corporate limits of the town of Orland. Residents living along the south side of South Street, or Bungalow Row, and those along the east side of Papst Avenue will soon be in a position to avail themselves of all the advantages of water and sewer service. Sewer lines are to be laid along both the streets named. Water service also will be available, and if the properties in question are included in the corporate limits, the residents will be entitled to service that is not now admissible.

Orland—the project of no regrets—struck a balance on January 1, and even the optimists were surprised. With only four-fifths of the land included in the project irrigated the value of the crops produced each year exceeds the entire cost of the works.

The gross value of crops from 16,000 acres now under cultivation was \$1,578,000, or \$98.62 per acre.

More important by far than its high average returns per acre is the high standard of citizenship which has developed here. Contrasted with the desolation of its old wheat ranches with the tumble-down dwellings, deserted for most of the year, the Orland of to-day is a valley of attractive and artistic homes, occupied for the most part by owners who are busy in the labors of making the project the one perfect spot in which to live. Yes, we say it in italics, *Orland has made good.*

*Colorado, Grand Valley project.*—One of the most important events in the history of dairying in Mesa County is connected with the recent sale of over 30 head of pure bred Holstein milch cows, the collection of the Clymer dairy at the Indian school farm and a number by J. F. Shults, and raised in the Plateau Valley.

There were only 200 men at the sale, but every one apparently was there to buy one of the splendid animals. There was also no hesitation about the bidding and Auctioneer Shults had no more than announced the name and history of a cow than the bids began, starting at the \$200 mark in most cases.

The average price received for the 26 milch cows was \$214.50 and the highest cow went to O. J. Claypoole, bringing \$375, a record price for any cow sold in this county. E. W. Weckel, of Fruita, bought two for which he paid \$295 each; Arthur Johnson, of Mesa, bought six at an average of \$225, and Robert Ingram, from the same section, took away two cows at an average of \$200 each.

The result of such a sale is the distribution of these pure bred animals over the county and it will stimulate the breeding of the very best grade of animals.

Because of the rapid expansion of the dairying industry over the western slope territory, the directors of the Mutual Creamery Co. have authorized the expenditure of funds sufficient for the doubling of the capacity of their plant in this city. This action was taken by the board at Salt Lake City, where they have been in session. Work on the enlarging of the present building by the addition of a second story will be begun as soon as weather conditions permit. Already orders have been placed for the needed machinery and it will be installed as soon as building operations are completed. This action is being taken by the Mutual company in order that they may keep apace with the dairying interests over western Colorado and eastern Utah. It will make possible a business of \$1,000,000 a year through the local branch of the Mutual company alone and will make the Grand Junction plant one of the largest to be found in the entire West.

At present the Mutual plant has a capacity of 60,000 pounds of butter per month, while with the machinery soon to be installed this will be increased to from 125,000 to 150,000 pounds, or something over

100 per cent increase in the butter capacity. The company also enjoys a tremendous business in eggs, cheese, and the various other dairy products.

*Colorado, Uncompahgre project.*—R. C. Bacon, representing the Colorado Packing Co., announced that a canning factory is to be located in Delta. The site has been secured and 1,000 barrels of cement have been ordered to begin the construction of the building. The machinery has already been purchased.

It is hoped to be able to have the factory in running order in time for putting up of cherries this spring.

The Delta Flour Mills Co. recently completed details for the installation of a first-class alfalfa meal mill to be operated in connection with its flour mill proposition.

Mr. Grabill has returned from a 10-day trip over the State in the vicinity of Pueblo and the Arkansas Valley and he was thoroughly convinced after his inspection that Delta was just about ripe for such an enterprise.

This is an enterprise which the Delta County farmers have long expressed a desire to have located here and it is now up to them to furnish good hay to the mill for the manufacture into good meal.

The mill will be operated by water power, of which the company owns an excellent system. This will not only insure constant service, but will be the cheapest power available.

Montrose is to have a sugar factory, with a daily capacity of 1,000 tons.

Failing to line up at Delta, the Midwest Co., a California corporation, turned its attention to Montrose and recently E. A. Nickerson, E. N. Combs, and A. W. Keck, officers of the company, were on the ground and all indications point that an agreement will be reached with the citizens for the transfer of a plant costing \$900,000 in 1906 from California here.

The Midwest people at first asked a bonus of \$400,000 from Montrose people. Later this amount was reduced to \$200,000.

At a mass meeting \$35,000 was subscribed on the spot. Later \$65,000 additional was subscribed, and there is no doubt that the remaining \$100,000 will be forthcoming.

*Idaho, Minidoka project.*—L. C. Aicher, seed expert of the Government, in answer to why Idaho, and particularly Snake River Valley, produced so much more seed than other sections of the United States, stated that it was due to the favorable climatic, soil, and moisture conditions, the dry, hot climate being very favorable for pollination and production of seed in connection with our fertile soils and the fact that irrigation water is available at the proper time. It is known that Idaho, at the present time, has the best quality clover seed grown in the United States. Mr. Aicher pointed out that the average yield of southern



Idaho is about  $6\frac{1}{2}$  bushels per acre. The next State in production is Oregon with an average yield of  $3\frac{1}{2}$  bushels. The average yield for the United States is  $1\frac{1}{2}$  bushels per acre.

Rupert's newly organized chamber of commerce is confronted with an opportunity of great moment to give the county seat of Minidoka County a forward movement which it is hoped will not be neglected. Numerous enterprises are looking for a chance to establish themselves in this thriving community, and it wants only a little of the get-together spirit to bring this about. The town people have always erred on the side of conservatism. During the early period of the project and its largest Government town, there was but little pulling together. Burley, a strong rival, was made up of boosters, and they made a wonderful little city notwithstanding that end of the project was the most delayed in its construction. Rupert had the big advantages of project officers and pay roll and a large area of cultivated lands, but it did not have the right civic spirit in the early days. To-day its citizenship is alive and progressive, and under wise leadership, and with the proper organization, Rupert is destined to push ahead rapidly. The world is just beginning to realize that Minidoka, the Electric Project, is really one of the western wonder spots. Every organization in the valley should be shouting about the project's advantages, resources, and attractions. There is a lot more to brag about here than in other places that occupy the public eye. Let us get together and tell about it.

The Adams Produce Co., after a thorough search of the country, has procured a limited number of certified Netted Gem seed potatoes for distribution among the farmers. The potatoes they have are the only certified Netted Gems raised in the State and farmers are taking advantage of the opportunity of getting this seed for their next crop.

Farmers in other localities are also interested in this seed, but as it was secured for the benefit of this locality, the produce company is anxious that the farmers in this neighborhood take advantage of the opportunity of getting good seed.

John D. Remsburg, who lives 3 miles northeast of Rupert, has graded and sold the potatoes he raised from 14 acres of land last year.

His 14 acres of Netted Gems made a total of 3,300 sacks, which were put in the cellar. During the winter he sold 200 sacks to individuals, realizing an average of \$2.75 per sack, or \$550. He has just graded 1,600 sacks of No. 1s which he sold at \$4 per 100 pounds, or a total of \$6,400, and 1,200 sacks of No. 2s brought \$2.50 per 100 pounds, or \$3,000.

This gives Mr. Remsburg a total of \$9,925 off the 14 acres, besides having 300 sacks of culls still in the cellar. He also picked out 100 sacks of selected seed for this year's use.

The cellar into which the spuds were deposited cost \$1,000 and is a model one. Many farmers are expecting to build cellars of this kind this year.

Mr. Remsburg figures that it cost 20 cents per sack to put the potatoes in the cellar, and 30 cents to sort and put them aboard car. He paid 7 cents per sack for picking and the potatoes were so large that over \$10 per day was made by some of the pickers.

An ordinance calling for a \$5,000 bond issue, for the purpose of building or acquiring a power plant, has been passed by the village board of Heyburn. Bids for the bonds are now being asked for.

Heyburn, along with other towns on the project, has been doing things in the way of improvements, recently. A short time ago a live commercial club was organized and much good is being accomplished. Many new people are locating there and a building boom is expected to be started this spring.

Acequia, another of the Government towns, is waking up. Its new commercial club is on the job and going strong for street grading and lights.

*Montana, Sun River project.*—One of the noteworthy developments of the past year has been the remarkable advance in price of irrigated land in this section of Montana. This is called to mind again by the fact that a 40-acre farm at Simms sold recently for the record price of \$175 per acre. The farm was that of Henry Welch and corners with the Simms townsite on the southeast. There is a small house and barn on the place, but otherwise the improvements are not especially valuable, and the price may be taken as indicating the value of irrigated land itself, and of the value that Greenfield bench lands may be expected to attain. The purchaser is E. S. Lindberg who already has considerable holdings of irrigated land in the Simms Valley.

The A. J. Dorchester place east of Simms, also a 40-acre tract, which was bought recently by R. E. Frost, bought \$4,500.

*Montana, Flathead (Indian) project.*—The school buildings both at the Mission and Ronan are inadequate to take care of the needs of either place, so the school board at its last meeting decided to submit a proposition to the voters at the coming election to vote \$100,000 worth of bonds to build new buildings at each place. It is thought that each of these buildings will cost \$40,000, the plan being to build them of brick and equip them modern in every respect, including large gymnasiums. The balance of the money if the bonds are issued is to be used in erecting a new schoolhouse at North Moise and the building of teachers' cottages at Arlee and D'Aste.

Every day sees dozens of farmers hauling feed out of town. Most of them express the idea that they will never be caught in the same fix again. Many different kinds of feed will be grown the coming year. One farmer who lives out in the Spring Valley country

says that one of the first things he intends to do this year is to build a pit silo. Then he expects to plant enough corn and sunflowers to fill it. He says he tried out both those plants and in spite of the dry weather he could have had plenty of feed if he had had any way of saving it. After several years' experience he says that he is satisfied that by planting the proper thing some kinds of feed will be grown even in the driest years.

John E. White, who owns many acres of farm and timber land northwest of Kalispell, is considering a new venture. First he proposes to sell off most of his wheat land and raise hay and alfalfa on the river bottoms. As a side issue he will start a fox ranch and make the foxiest fox-raising headquarters in the State. Silver foxes from Minnesota will be bought to stock the farm, and it is the intention to have at least 300 pair next fall. Large pens will be installed on the farm, fenced with 8-foot wire, which is also buried several feet under the ground and inward to prevent the escape of any animals by burrowing underneath the inclosure. Mr. White also proposes to build the dens of cement, making them practically indestructible.

*Montana, Lower Yellowstone project.*—The class in dairying at the Dawson County high school is at the present time receiving some very practical experience in the manufacture of butter and cheese. Milk is being furnished by the local dairy. Upon being received at the school it is heated to the proper temperature and run through the cream separator. At this time various experiments are tried to show the effects of speed of the separator, the temperature of the milk and the position of the cream screw.

After the milk has been separated, the cream is cooled as quickly as possible to about 40° and held for churning. The skimmed milk is used for cheese making.

The school has a complete cheese-making outfit and last week the boys made 10 pounds of cheese. This cheese will be sold in Glendive as soon as it becomes ripe.

Six pounds of butter were made on Saturday and sold to Glendive families. The dairy laboratory is equipped with a barrel churn and an Ideal butter worker. All the equipment is such that can be used on any farm in the country. The idea is to teach farm butter and cheese making.

The Good Old Yellowstone Valley seems to be coming into its own at last and the predictions of the most optimistic forecasters of 1905 appear to be making good. In the old days when the Big Ditch was first talked of, the optimist said that land in the valley would sell at \$100 per acre or better when under irrigation, but hardly any one believed them then.

Recently the Hans Jorgenson, 86½ acres, a mile north of Sidney, was sold to Messrs. J. M. and Anton Fransden at \$175 per acre. Mr. J. M. Fransden, who has resided near Sidney for some time, is well known, and Mr. Anton Fransden, his brother, comes from Nebraska. These gentlemen have now one of the very best irrigated tracks in the valley, and while they have "topped the market" in paying \$175 per acre for this farm, they are sure to make it pay big returns on the investment. This farm was listed with the Sidney Land & Loan Co., we are told.

*Nevada, Newlands project.*—Fallon's depot force handled one of the largest volumes of business during the month of January since the branch line was built into this city in 1907. A total of 445 cars was dispatched out of the local station during the month, loaded with project products and 142 cars were received during the same period. Outgoing cars to the number of 339 were loaded with baled alfalfa, consigned principally to western points. Forty-seven cars went out in the month loaded with prime beef cattle, 23 with alfalfa meal, while 1 car went out daily on an average loaded with merchandise.

Thus it will be seen that Fallon loaded and sent out each day during the last month a train of about 15 cars, which converted into money means a mounting trade balance for the community.

January incoming shipments included 23 cars of merchandise, 16 cars of coal, 37 cars of live stock, 30 cars of sand, 9 of lumber and 9 of crude oil and 18 of miscellaneous consignments.

C. C. Cottrell, State engineer, apportioned 75 new Government trucks recently received from the War Department to the several Nevada counties on a basis of assessed valuation, two being awarded to this project. County Commissioner W. H. Williams accepted one of the trucks for early delivery and its addition to the county's present equipment will mean that three modern and fully equipped trucks will be in use on the roads here.

District Engineer Hordwege stated that the Leetville-Hazen link of the State's highway system will be one of the projects to be taken up early in the spring and that the 4 and 8 mile flat highway projects in the Sand Springs section will be undertaken by the contractor soon and rushed to completion.

During February many additions to the herds of the ranchers were made through outside purchases. Two new dairy herds were brought in, one of 20 head of first calf Holstein heifers, which were purchased for \$112 each, and the other a herd of 34 head of mixed Jersey, Holstein, and Shorthorn cattle, the average price being \$135. One rancher while attending the Denver show purchased two carloads of registered Shorthorn bulls and has since sold them to the project stockmen.



*New Mexico, Carlsbad project.*—In the Carlsbad project last year 8,713 acres were planted, averaging 290 pounds of gin cotton or six-tenths bale to an acre. The maximum production was 1,376 pounds, or  $2\frac{3}{4}$  bale per acre, while the minimum was 50 pounds. The value of the total crop was over \$1,400,000, grown on an area covering one-quarter of the project. About 80 per cent of the seed planted was Durango, averaging  $1\frac{1}{4}$  staple. So Carlsbad has advanced into the 100 per cent class at last. Watch her strides in 1920.

*New Mexico, Rio Grande project.*—Word has just been received that the Elephant Butte Water Users' Association and the business organizations of the Mesilla Valley, have subscribed the necessary amount and we are going to prepare an up-to-date film scenario of that irrigation district. This is the second fund these enterprising folks have subscribed, the fund in 1914 furnishing us with some excellent material for the Panama-Pacific Exposition and afterwards utilized through various distribution agencies to exploit the valley. We showed the boys in France, England, Belgium, and Germany the great Elephant Butte Dam and scenes in the upper and lower valleys. We even sent reels to far-off Russia, where same are yet showing. But the pictures were taken in the period of construction and did not do justice to the valleys' resources. Now, our new reels are going to show agriculture, live stock, marketing cooperatively grown staples, and the social and business side of the valley. Next winter these reels will be shown in Red Cross community centers, and through other agencies of the Bureau of Education and Commercial Economics we shall reach audiences in every part of the United States. It will require a trip this spring and another in the fall to complete the picture job.

About 75 men, chiefly prospective cotton growers, held a meeting at the Farm Bureau offices recently. The offices were crowded and it was one of the more enthusiastic farmers' meetings ever held in Las Cruces.

Mr. J. P. Wray, of Yuma Valley, made the farmers a proposition to put in a gin, costing approximately \$25,000, which offer was accepted. A portion of the stock of the company will be set aside for the farmers to take up in shares of \$100 each if they wish to do so, but that is not a consideration in the deal and the farmers will not be required to take stock if they do not care to do so.

The organization will be known as the Mesilla Valley Cotton Growers' Association, with units to attend to every cotton-growing district of the county with the parent office in Las Cruces.

It is the intention of the association to put in four gins in the valley; one at Las Cruces, one at La Mesa, one at Anthony, and one at Fort Filmore. This will be finally determined by the cotton acreage.

In order to avoid any possibility of facing a shortage of cotton seed at planting time, the Farm Bureau

undertook to purchase cooperatively several cars of seed. The communities involved in the purchases have reported 6 cars purchased to date with a saving of over \$3,000.

Because of heavy rains and poor maturing weather, most of the cotton seed over Texas was classed as undesirable for planting. The demand for good seed resulted in the corraling of the available supply and prices have been steadily advancing. It is anticipated that spring purchasers of cotton seed will face sharp competition in both quality and price.

A purchasing committee composed of L. J. Ivy and M. E. Van Every, both of Tornillo, made the selection of most of the seed purchased after visiting the Pecos Valley and other points. Independent purchases were made by the financial agents in the several districts.

In order to avoid the necessity of borrowing funds, arrangements were made whereby the sum of \$2 was collected in advance for each bushel ordered, with the understanding that actual cost would be charged. As a whole, the seed purchased cost less than the amount collected, and refunds are being made as fast as the seed arrives.

Purchases to date will furnish seed enough to plant about 7,000 acres. Dealers have placed orders for a supply adequate to take care of further requirements.

The Farm Bureau News, published by the El Paso County Farm Bureau, is a very interesting publication of 16 pages, illustrated and chock full of live matter for the project people. As a compendium of the activities of the bureau and of the farmers it is mighty good reading, and its circulation should be extended beyond the project limits. No homeseeker who is contemplating a move this spring could read the February issue and not be lured to this sunny valley.

Crowned by years of valuable service to his community, years in which he has given freely of his best, our good friend, J. A. Smith, last month retired from the presidency of the Rio Grande Water Users' Association.

From way back in the eighties Smith was a staunch advocate of national irrigation, and was connected prominently with every big movement in this direction. He was one of the earliest and strongest supporters for the Rio Grande project as finally approved and now so nearly completed. As president of the Water Users' Association he has held the valley together for drainage, for better and more economical use of water, and as the leader in all irrigation and agricultural matters he has endeared himself to the people in the valley. President Smith is a familiar figure in Washington, to which he has been a frequent visitor in the interests of the valley.

The voluntary retirement of Mr. Smith from the active work of the board, while regretted, does not mean any lessening of interest in the valley toward whose development he has done so much. He will always be active in promoting the welfare of this sec-

tion with which he has so long been associated. Best wishes to you "Uncle Jimmy."

*Washington, Yakima project.*—Plans for farming 8,000 acres of beets in the Yakima Valley and 1,000 acres in the Walla Walla district are being matured by the officials of the Utah-Idaho Sugar Co., according to W. D. Lewis, of Toppenish, in charge of the company's acreage campaign.

In case the sugar people are successful in buying or leasing enough land to make up this total when the company's holding is added to that farmed by individuals, there will be enough beets raised to justify the operation of all three factories in the valley, Mr. Lewis considers. The company is at present paying between \$20 and \$35 an acre for leases of reservation lands, which is about the same as paid last season, according to Mr. Lewis. He says that the prices average a little higher this season, though the \$35 price was reached last year.

Mr. Lewis has been active recently in leasing and buying land on the reservation, but has been too busy to make any totals of the amount he has obtained. He says that a great many deals are now pending. The company will follow out its annual custom of having a spring acreage campaign to induce the Yakima Valley farmers to raise beets.

George W. Dilling, who after a visit to 12 agricultural States, finally decided to purchase a ranch and settle down on the Yakima project, says:

The Yakima Valley, which last year stood third highest in the country's producing counties with \$45,000,000 worth of products exported, is undergoing a tremendous movement in farm tracts, a movement of the permanent settler type.

In Illinois, farm lands are selling at \$400 to \$500 an acre, and there is little of them to be had. In Iowa good lands sell at \$500 to \$600 an acre. In Northwest Missouri, where the lands are not so good, \$250 to \$400 an acre, and in central Nebraska \$350 to \$410 an acre. It is to be noted that these lands primarily are suitable for corn and oats only.

Now take the comparison with Washington farm lands, and I have in mind the Yakima district, which has been interesting Seattle investors of late so much that three families I know have gone to the valley to join the ranks of producers. Our lands yield three times as much hay as the Eastern lands, raise fine corn, and have, in addition, splendid small crops and fruits, with water rights added. With all these attractions our lands still sell at from \$250 to \$325 an acre.

Can you explain this anomaly? When the country was wet Yakima hops brought from 10 to 20 cents per pound. Now that we are as dry as a bone and no decision reached as to the legality of 2.50 per cent beer, the same Yakima hops are contracted for at 50 cents per pound.

Fruit is such an important industry that a census of trees is taken regularly. The latest report shows 2,050,181 apple trees in Yakima Valley, 494,118 pear trees, 304,315 peach, and others like prunes, plums, cherries, apricots, etc., making a grand total of 2,975,411.

C. G. Sprong in particular and the Grandview district in general were paid a very high compliment when W. S. Clark, of Honolulu, paid \$4,000 for seven head of Mr. Sprong's thoroughbred Holsteins.

Mr. Clark went through California in search of thoroughbred stock but found none that suited him. He was advised to come to the Yakima Valley and did so. Price was no object to him, he wanted quality. He knew what he wanted and it didn't take him long to see that Mr. Sprong had what he needed.

Mr. Clark has 30,000 acres of land in the islands, part of which he uses for sugar raising. He also took a car of fat cattle from the valley.

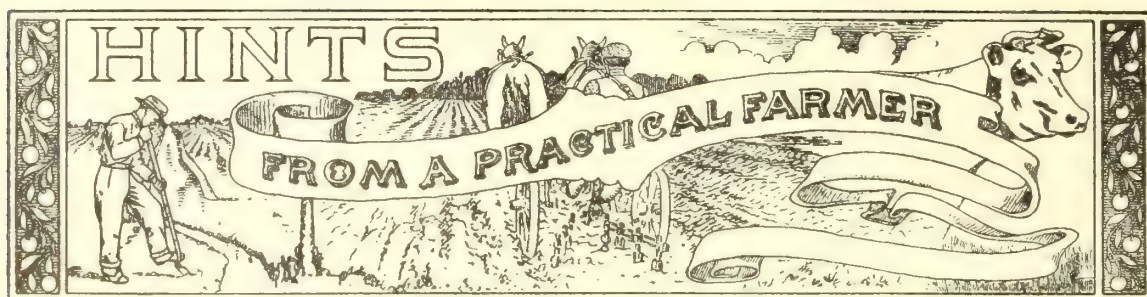
*Wyoming, Shoshone project.*—From a field of 10 acres of spuds William Hawley stored last fall 3,000 bushels of the crop and now finds as a result of the unexpected rise in the market that his venture has proved profitable far beyond his expectations. Had he sold at digging time Mr. Hawley would have received about \$1.40 a hundred or \$2,500 for the crop, but now they are selling for \$5 a hundred and he finds that the spuds are worth \$9,000. Mr. Hawley could take the money received from his spud crop and pay Uncle Sam all the building charge on his 80-acre farm, including drainage costs, and have enough left to buy a six-cylinder automobile. It would pay 10 per cent interest on land at a valuation of \$900 an acre. While only a few of the potato growers will be lucky to share in the big price it nevertheless emphasizes the importance of providing storage and it is predicted that the big potato storage warehouse in Powell will turn out to be a profitable investment.

The Charles Hoffman farm, near Garland, containing 57 acres of irrigable land, has been leased for beet growing. The lease is for a five-year period on a cash rental basis of \$1,900 a year or \$33 per acre. The land is now ready for beets and the tenant, it is understood, intends to depend principally on the beet crop for his returns.

It was but a very short while ago we announced with quite a thrill a sale of land near Powell at \$150 per acre. Of course a lot of people regarded the purchaser as a lamb who had been well shorn. A trifle later another tract sold for \$200 per acre and everybody felt sure the maximum had been attained. Now a real estate transfer at \$250 excites no comment, and big deals at \$200 or better are very common. One recent large sale is worthy of record. The C. W. Fowler homestead and a tract of school land were sold for \$52,000. If we include cost of irrigation the purchaser will ultimately pay \$66,000 for his ranch. We seem to remember not so very many years ago when the owner of the ranch was anything but optimistic about the future of the Shoshone project.

The Williams ranch adjoining Powell and containing 40 acres was sold recently for \$16,000. This is a go up in price of \$4,000 in a single year, and \$4,000 is going some. We'll say it is.—C. J. B.





### Humus—The Life of the Soil.

The following discussion on humus is from the pen of S. P. Clark, extension agronomist of the College of Agriculture, University of Arizona. Mr. Clark says:

The desert soils found in Arizona are very deficient in humus or decayed organic matter. In any region where the desert is being reclaimed for farming purposes the problem of supplying the deficient organic matter is the first one with which the farmer is confronted. Humus must be put in the soil for the following reasons:

Humus is the chief source of supply of nitrogen.

Humus, when decaying, makes available plant food from the store of unavailable plant food in the soil.

Humus acts as a sponge and increases the water-holding capacity of the soil.

Humus makes the soil more mellow and granular.

Humus binds together the soil particles and thus prevents the soil from drying by wind or washing by rain.

Humus permits air to enter heavy clay soils more readily.

Humus makes soil darker in color.

Humus furnishes food for countless numbers of bacteria that are helpful to plant growth.

Humus prevents baking.

All organic matter produced on the farm that can not be used as food should be returned to the soil to supply humus. Corn and cotton stalks, straw, and all spoiled hay, etc., should not be burned, for in burning, the organic matter is destroyed. They should be worked into the soil where they will decay and form humus. All manure produced should be saved, spread upon the fields, and worked into the soil. If enough material is not furnished in this manner to keep up the supply of humus then some crop should be plowed under for this purpose.

The best crops to plow under for green manure are cowpeas, soy beans, sweet clover, rye, and sorghum. Any of these crops may be planted in the spring and plowed under in June in time to plant a crop of sorghum or corn in July. In this way a season's crop is not lost and the soil is benefited.

### American Swineherd Pointers.

#### FARM BACON AND HAM.

Farmers are always anxious to get any improvement in the methods of curing or butchering in saving their own meat. A Missouri farmer who has a good reputation for putting up and curing meats that are made famous among his neighbors states:

After the hogs are fat, select any time in November, December, or January, when the weather is clear and the wind from the north or northwest, with the thermometer registering below 35° at sunrise. Have the water hot and scald as soon as the hogs are dead. Hang up and remove the entrails. As soon as they are clean, cut up the carcass as soon as it is through dripping. Saw or split the backbone. Let it and the spareribs remain on the side, and make them as long as you can. Leave the hams and shoulders small. To a half bushel of fine salt add a half pound of pulverized saltpeter, 1 pound finely ground black pepper, 4 pounds of brown sugar; mix thoroughly. Rub the ham with this mixture. Pack in a box, skin down.

Apply a double handful of the mixture to the flesh part of each ham. Then apply plenty of clean salt, never permitting the meat to touch without salt being between, covering all parts and filling every crevice. Then let them remain in the salt for six weeks.

After being in the salt for six weeks, select a clear day, string each ham, and dip in a boiling solution of 1 pound borax dissolved in 15 gallons of water and hang up high in a dark smokehouse and smoke, using green hickory wood. Smoke daily for two weeks or more. By April 1 at the latest, hams should again be dipped in boiling water, to cleanse them from all impurities, wrap in paper, then cloth, and paint this with some cheap mineral paint. Hang up again and leave until used.

For sugar-cured bacon use the following: When the meat is cool, pack it away in a water-tight box and apply for each 100 pounds of meat 8 pounds of salt, 2 pounds of brown sugar, and 2 ounces of saltpeter. Dissolve all in four gallons of water and cover the meat with this brine. The bacon strips should remain in this brine from 4 to 6 weeks. They should

then be taken out, washed off, and hung up to smoke. Hickory wood should be used for this also.

#### HOGS NEED BONE BUILDERS.

Prof. W. A. Henry, of the Wisconsin Experiment Station, in reply to a question as to the necessity of feeding bone meal to pigs, says:

"When pigs are kept in normal condition and receive a variety of feeding stuffs it is usually not necessary for the stockman to use bone meal. If he feels that bone meal is necessary a tablespoonful a day to each pig put in the slop would be sufficient to get any possible benefit. It will be equally well as a rule to allow pigs to have free access to hardwood ashes and this should always be done or some other substitute given. Pigs which can root in the earth no doubt receive benefits therefrom. Gritty matter probably kills intestinal worms and may correct the abnormal conditions of the stomach or intestines. In the great corn districts hogs are constantly losing in quality, as is shown by the common complaints of 'too fine bone,' 'broken legs at shipping time,' 'pigs born weak' and so on. Bone meal, ashes, rotten wood, coal slack, slaked lime, mortar, and similar substances are all helpful in feeding pigs. All of these, however, singly or combined, can not make up for the loss of a suitable variety of feeding stuffs, some of which should be rich in muscle-building food (protein) and ash for the bones. Skim milk or buttermilk is the ideal food for young pigs for both bone and muscle building. Middlings or ship stuff will prove helpful. Then let the stockman use clover, alfalfa, and blue grass additional. With these feeding stuffs on the bill of fare some corn can always be given, and as the fattening period approaches more and more may be supplied with profit."

#### THE HOG.

In these days, when economy is preached and should be practiced by everybody, and especially the farmer, the hog will prove one of the greatest frugal and saving animals upon the farm.

The hogs can turn out over one-third more gain in flesh for each 100 pounds of grain eaten than steers will from the same amount. While the steer is at least two years reaching market, the hogs are ready for the butcher in six months.

A hog will glean in the grain fields for the scattered wheat, rye, barley, oats, corn, etc. Also uses up the by-product of the dairy, skim milk, buttermilk, and house slops, and makes them into pork. Also the fallen fruit in the orchard is converted by them into good pork for the butcher. Also other thrift is shown through various other natural saving propensities of the hog.

The farm without a herd of hogs is wasteful, unthrifty, unprogressive, out of date, and needs reforming.

#### How to Control Hog Mange.

Hog mange is spread mainly by direct bodily contact. The disease is contracted most rapidly among hogs of low vitality, especially those kept in small inclosures. It spreads more slowly among vigorous animals kept in pastures or in clean, well-lighted, roomy pens or buildings. Failure by swine owners to control hog mange results in heavy losses from shrinkage as well as from a high death rate. The disease can be eradicated by four dippings in a lime-sulphur or arsenical solution with intervals of 6 or 7 days between dippings.

#### Swine Rations Including Alfalfa.

The object of fattening hogs is not growth so much as fat. Corn is the main dependence in the production of fat in the United States; the only substitutes of any importance are the grain sorghums. Enough alfalfa, shorts, tankage, or other protein feeds are used to balance the ration.

The following swine rations including alfalfa are suggested by W. B. Schneider, of the Arizona Packing Co., and secretary of the Arizona State Farm Bureau:

*Brood sows, dry.*—(1) Alfalfa pasture alone best during dry season. (2) Alfalfa pasture; 1 pound of grain daily.

*Brood sows with litters.*—Allow 3.5 pounds of grain per 100 pounds live weight daily, consisting of milo, hegari, barley, corn, feterita 60 parts, bran 10 parts, shorts 10 parts. Alfalfa pasture or hay at will.

*Growing pigs.*—Allow 2.5 pounds of grain per 100 pounds live weight daily, consisting of milo, hegari, barley, corn, feterita 65 parts, shorts 30 parts, tankage 5 parts. Alfalfa pasture or hay at will.

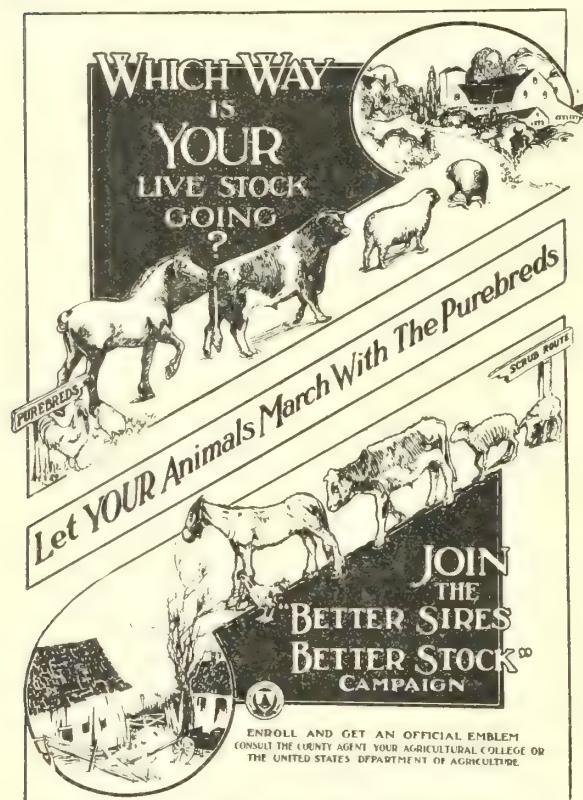
*Fattening hogs.*—(1) Allow 3.5 pounds of grain per 100 pounds live weight daily, consisting of milo, hegari, barley, corn, feterita. Alfalfa pasture or hay at will. (2) Allow 3.5 pounds of grain per 100 pounds of live weight daily, consisting of milo, hegari, barley, corn, feterita 6 parts, shorts 1 part. Alfalfa pasture or hay at will.

#### More Good Horses Needed.

The thing most needed in the production of work horses for American farms is greater care in the selection of the stallion and the brood mare. Not only was there a net decrease of approximately 373,000 in the number of horses on farms on January 1, compared with a year ago, but there has probably been an even more marked decrease in the number of mares bred during 1919. The extent of this decrease can not be accurately determined until the colt crop of 1920 is estimated. However, if the decline in breeding is as great as conditions now indicate, the country will be confronted with a seriously depleted supply of good horses within the next few years.



Many farmers are using up their work stock without making any provision for the future. Such a policy is short-sighted and will have serious results. The present need is to increase the percentage of efficient horses by careful selection of parents. One of the principal factors from which the market is suffering is the breeding of too many low-grade work animals. There is a strong demand for high-class horses, at good prices.



### Many Farmers Take Up Accounting.

One-day farm accounting courses are now being given in 15 States through the cooperation of the United States Department of Agriculture and the State agricultural colleges in farm management extension work. The primary object of these courses is to interest the farmer in farm bookkeeping as an essential to efficient farm management. Although the assistance which the courses give in calculating a farmer's income tax is of great value, it is necessarily secondary.

This is the first year in which this method of introducing farm accounting has been undertaken on such a large scale. The schools are carried on in cooperation with the county agents. The one-day ses-

### BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture.

#### FARMERS' BULLETINS.

No. 1060. *Onion diseases and their control.*—Onion smut, onion mildew, smudge, neck rot, soft rot, black mold, and other diseases are described in this illustrated bulletin, with suggestions for their prevention.

No. 1070. *The fowl tick.*—This serious poultry pest is described and methods are given to keep the premises freed from it.

No. 1073. *Growing beef on the farm.*—The successful production of beef calves, and their development into profitable animals, whether for stockers, feeders, or finished animals for slaughter, is a phase of the beef-cattle business that concerns beef producers everywhere.

No. 1091. *Protection of potatoes from cold in transit.*—This illustrated bulletin explains successful methods of lining and loading potatoes in box cars, produce cars, refrigerator cars, and heater cars.

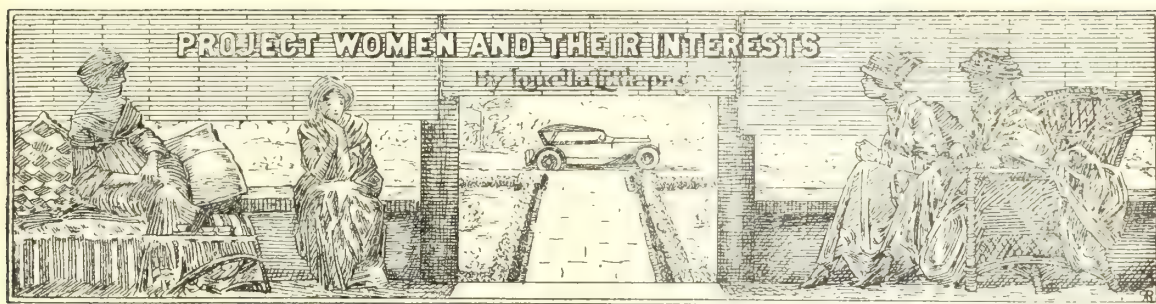
No. 1095. *Beet-top silage and other by-products of the sugar beet.*—This illustrated bulletin discusses the more profitable methods of utilizing the tops and other by-products of the sugar beet.

#### DEPARTMENT BULLETINS.

No. 825. *Rural community buildings in the United States.*—Throughout the country there is a keen and widespread interest in community buildings, their activities, their accomplished results, and their possibilities. Their development is so recent and they are so essentially an outgrowth of rural life and conditions that knowledge regarding them necessarily has been fragmentary, in most cases limited to impressions gained from observation of a few isolated houses. This bulletin summarizes the results of an investigation of this phase of social rural organization.

sions are occupied with calculations made by the farmers themselves under the supervision of the instructor, and discussions of such topics as the relative value of various crops, the size of crop yields, the quality and quantity of live stock for a farm of given size, the size of the farm business as a whole, and the farm layout, and the use of labor—all factors vitally affecting farm efficiency.

I have liked the RECORD very well. It has always manifested a spirit that is very helpful to anyone who studies it.—J. J. Toothaker, Olympia, Wash.



### Make the Garden Work Easy.

It was a rather frail little lady who walked into a doctor's office recently leading two tired-looking children who dropped listlessly into chairs without even one inquisitive look so characteristic of children in new surroundings. In response to the doctor's inquiry as to what he could do for her the little lady replied—"Oh, we all have spring fever, I guess, but it's discouraging to have it hang on so with all the work there is to do on the farm this time of year. I suppose I should have given them all sulphur and molasses, but when I was quite small I made a vow that my children never should be fed up on the horrible concoction which grandmother used to dose us with," and she shuddered at the recollection.

The doctor grinned sympathetically as his mind turned backward to his youthful days when spring-time was inseparably connected with noxious tonics and that universally tired feeling. But these days spring tonics are rarely taken, for that tired feeling except on occasional days from barometric conditions is a thing of the past. Science has at last discovered the reason for the blood purifying of our parents and grandparents, and for the deadly languor that settled over the spirits in spring.

It was all a question of diet. There are elements in certain foods that are absolutely necessary to normal nutrition. Unless these elements are present in sufficient quantities children do not thrive well, nor can adults maintain the fullest health and vigor. These unknown elements are now known as vitamins. The narrow diet of the pioneers did not contain these vitamins, and the deficiency was particularly felt in winter when there was not even fresh fruit to give variety. You all know of the experience of the early mariners, how they fell prey to deadly diseases unless they could secure fresh vegetables from time to time, and the veterans of the Civil War, particularly prisoners, who suffered from what was commonly called scurvy. Our forefathers suffered in a lesser degree from the same cause—lack of life-giving vitamins.

Grandmother had no knowledge of germs and fermentations; she never heard of a Mason jar or a pressure cooker; if she had a cow some of the butter at

least must be exchanged in the village for tea and sugar, and the skimmed milk was fed to the pig. There are two sources of vitamins. One of the most prominent is that of pure butter. The other source is the leaves of vegetables, grass, and fruits, and vitamins from one of these sources alone are not adequate; we must include both kinds in our diet.

The reason why that tired spring feeling has nearly disappeared from the land is obvious. Without realizing it we have dropped into a sound scientific practice in varying our food with butter, milk, eggs, vegetables, and fruits, so that most of us are receiving sufficient vitamins for the best of health. A diet of potatoes, meats, and cereals is bad practice. We must have pure butter, or at least milk and cream, on our tables, and we must have good vegetables and fruits.

Of all people on earth farmers' families are the last who should suffer from an improper diet, and so the doctor looked quizzically as his little patient as he tactfully drew her out on intimate questions of home work and learned that the children never liked milk but drank coffee and tea with their meals; that they marketed their butter by parcel post and purchased at less than half its value a butter substitute made from coconut oil; that she did not can nor dry vegetables for winter use, in fact had grown very few vegetables or fruits because the men were too busy to make a garden and she did not have the strength.

Of several thousand farm women who answered a series of questions sent out by the agricultural extension service of the Government, 92 per cent had gardens, and 56 per cent of these gardens were tended mainly by the women themselves. If this be universally true, as it probably is, it is important that the farm garden be so planned that the work of cultivating it will be comparatively simple and easy. All of the heavier work, such as plowing and fitting the land, should be done by men with the aid of a team.

The garden should be planted in long straight rows and cultivated once a week with a horse. If this much is done by the men the work of the women will be materially reduced, and the care of a home garden is not very hard work if the fitting of the land and the main part of the cultivation is done with horse-drawn tools. Plan the farm garden right and work it



right and it will prove the most profitable piece of land on the farm.

### How Many Calories Per Day?

While we are on the subject of foods it might be of more than passing interest to study a table prepared by the Department of Agriculture showing how to compute food values and comparative costs. Scientists have announced that "a family consisting of father, mother, and three children require about a hundred and twenty 100-calorie portions for an adequate daily diet."

Ten years ago the average housewife could not have told whether a calorie was a disease or an island, nor would she have cared. To-day she knows that it is something in food of which her family must have a certain amount, and with this table she can count the calories as well as the cost of the food she buys. She can use the table without knowing anything more about calories than she understands about the kilowatt hours that appear on the monthly electric light bill, but calories are neither so mysterious nor so complicated that she can not easily understand what they are.

The word calorie comes from "calor," a Latin word meaning heat. A calorie is a unit for measuring quantities of heat just as a yard is a unit for measuring length, or a pound for weight.

Now, food is fuel for our bodies, and the energy stored in it can be released in the body and used for keeping it warm or for the work of the muscles, much as gasoline is released and used when the gas is consumed in the motor. The more we exercise our muscles the more mechanical energy we release and the more must be provided by our food fuel. In order to make sure we are stoking our body engine rightly we must be able to say both how much energy our food yields and how much energy our bodies use. This is where the calorie comes in, for we can measure both food energy and body energy in calories. If we acquire this knowledge it spells both improved health and financial economies.

#### CHOOSING CHEAP FUEL.

Body fuel, like other kinds of fuel, costs money, and the problem is to get the amount needed for the smallest sum possible, which means choosing food rather carefully. If our family of five bought its 120 100-calorie portions all in sirloin steak at 50 cents a pound, the cost would be \$6 a day. If it bought them all in white potatoes at \$1.80 per bushel the cost would be only \$1.20 a day.

#### HOW TO USE THE TABLE.

Other things than fuel are necessary in human food. Not all of the necessary body fuel can safely be taken

from potatoes, for example, nor yet from beefsteak. Scientific investigations have shown that of the 120 100-calorie portions necessary for the family of five, about 24 should come from vegetables and fruits; 36 from milk, eggs, and meat; 30 from cereals and legumes; 12 from sugar and sugary foods; and 18 from fats and fatty foods. If these amounts are used as a guide in planning the meals of a healthy family, there is little need to worry about their not getting the right kinds and quantities of foods.

#### How to figure food costs by calories.

##### VEGETABLES AND FRUITS.

Article.	100-calorie portions.	Price.	Price per 100-calorie portion.
Potatoes.....	3 per pound.....	.. cents per pound.....	.. cents.
Onions.....	2 per pound.....	.. do.....	Do.
Cabbage.....	1 per pound.....	.. do.....	Do.
Corn, canned.....	3 per No. 2 can.....	.. cents per No. 2 can.....	Do.
Peas, canned.....	.. do.....	.. do.....	Do.
Tomatoes, canned.....	4 per No. 2 can.....	.. do.....	Do.
Prunes.....	11 per pound.....	.. cents per pound.....	Do.
Oranges (8 ounces each).....	10 per dozen.....	.. cents per dozen.....	Do.
Bananas (5 ounces each).....	11 per dozen.....	.. do.....	Do.

##### MILK, EGGS, MEAT, FISH, ETC.

Milk.....	6 per quart.....	.. cents per quart.....	.. cents.
Cheese.....	20 per pound.....	.. cents per pound.....	Do.
Eggs.....	9 per dozen.....	.. cents per dozen.....	Do.
Sirloin steak.....	10 per pound.....	.. cents per pound.....	Do.
Round steak.....	7 per pound.....	.. do.....	Do.
Rib roast.....	11 per pound.....	.. do.....	Do.
Chuck roast.....	7 per pound.....	.. do.....	Do.
Plate beef.....	12 per pound.....	.. do.....	Do.
Pork chops.....	.. do.....	.. do.....	Do.
Ham.....	15 per pound.....	.. do.....	Do.
Lamb.....	11 per pound.....	.. do.....	Do.
Hens.....	8 per pound.....	.. do.....	Do.
Salmon, canned.....	7 per pound.....	.. do.....	Do.
Mackerel, salt.....	11 per pound.....	.. do.....	Do.
Oysters.....	5 per quart.....	.. cents per quart.....	Do.

##### CEREALS.

Corn meal.....	16 per pound.....	.. cents per pound.....	.. cents.
Rolled oats.....	18 per pound.....	.. do.....	Do.
Wheat flour.....	16 per pound.....	.. do.....	Do.
Bread.....	12 per pound.....	.. do.....	Do.
Rice.....	16 per pound.....	.. do.....	Do.
Macaroni.....	.. do.....	.. do.....	Do.
Corn flakes.....	.. do.....	.. do.....	Do.
Beans, dried.....	.. do.....	.. do.....	Do.

##### SUGAR AND SUGARY FOODS.

Sugar, granulated.....	18 per pound.....	.. cents per pound.....	.. cents.
Sugar, lump.....	.. do.....	.. do.....	Do.
Sugar, maple.....	13 per pound.....	.. do.....	Do.
Honey.....	13 per pound.....	.. do.....	Do.
Molasses.....	13 per pound.....	.. do.....	Do.
Sirup, corn.....	14 per pound.....	.. do.....	Do.
Candy.....	17 per pound.....	.. do.....	Do.

##### FAT AND FATTY FOODS.

Butter.....	34 per pound.....	.. cents per pound.....	.. cents.
Lard.....	41 per pound.....	.. do.....	Do.
Vegetable oils.....	.. do.....	.. do.....	Do.
Bacon.....	26 per pound.....	.. do.....	Do.
Cream.....	9 per pint.....	.. cents per pint.....	Do.

Now a 100-calorie portion of some meats costs a good deal more than a 100-calorie portion of other meats. This is the case, too, with vegetables, and fruits, cereals, fats, and sweets. The cheapest food per pound is not always the cheapest food per 100-calorie portion. In this day of high prices, the housewife is interested in knowing what food that will adequately feed the family can be bought cheapest—figured on a sustenance basis rather than on a pound or pint basis, and that is what this table will help do, for it shows her how to determine the price of a 100-calorie portion of a particular food. All she has to do is to insert the price per pound or bushel at the proper place in the third column and divide it by the corresponding figure in the second column.

To illustrate: Suppose the meat-market man tells her that sirloin steak is 50 cents a pound. She writes "50" opposite sirloin steak in the third column. Then she looks at the second column and finds opposite sirloin steak "10 per pound." She divides 50 by 10. The quotient is 5. Five cents, therefore, is the price of a 100-calorie portion of sirloin steak. In exactly the same way she can find the cost per 100-calorie portion of any food. And what is more, if she gets in the habit of thinking in 100-calorie portions as well as in pounds and bushels, she will very soon know instantly how much such a portion of steak or apples or macaroni or any food represents, and then she will be able to estimate easily whether or not she is getting what her family needs and at the best prices.

The average grown person spends different amounts of energy at different occupations and under different conditions. The calories expended must be furnished by the food he eats each day.

The adult person spends:

When asleep, half calorie per hour for each pound of body weight.

When sitting (reading, sewing, etc.), three-fifths of a calorie per pound of body weight.

Standing, three-fourths of a calorie per hour per pound of body weight.

Light exercise (housework or walking), 1 calorie per hour per pound of body weight.

Active exercise (heavy domestic work, heavy outdoor manual labor), 2 calories per hour per pound of body weight.

Very heavy labor or exercise, 3 or more calories per hour per pound of body weight.

In general a simple table of adult calorie requirements each day is:

At complete rest, 14 to 16 calories per pound each day.

Light exercise, 16 to 18 calories per pound each day.

Moderate exercise, 18 to 20 calories per pound each day.

At heavy exercise, 20 to 23 calories per pound each day.

#### FOR WOMEN ONLY.

Now this is a secret—when you have figured out just how many calories of food you require you are absolute mistress of your weight. You must eat the exact amount in order to maintain perfect health; eating more than that amount will add to your weight, and less will make you lose. Therefore, in order to retain your youthful figure, you must never let the pounds gain on you, for reducing by eating less than is required is quite likely to impair your health. This is assuming of course that you have been following the food rules intelligently and not obtaining your strength-giving calories from sweets and fats and starches instead of a well-balanced ration. If you have, then change the route and cut out such foods for a while.

A grown woman requires on an average from 2,200 to 2,500 calories a day. If she works very hard—scrubs floors or does laundry work every day, or goes into the fields to work as some farm women do—she'll need 3,000. If she rests a bit or has a sedentary occupation, she'll need only 2,000. These figures are to maintain her normal health. To reduce she must eat less.

Of course these figures are general. An adult requires from 15 to 20 calories of food per pound per day, using the proper weight as a standard, so the first thing to do is to find out what your weight should be, then figure out the number of calories required, and eat only that amount.

#### Project Notes.

We hear very little about rest rooms these days, but they have been brought to our attention by a little item in the Flathead Courier, published in Polson, a live young city on the Flathead project, Montana. This "news" item was published for the benefit of those who might not otherwise be informed as to the advantages and benefits thus offered, but it contains wonderful suggestive possibilities.

The ladies' rest room is open to all, either from country or town, and has been so open since July 1 from 11 o'clock a. m. to 5 o'clock p. m., all days except Sundays. It is also kept open Saturday evenings. Here you will find a lavatory where you can clean up after your ride to town, or, if you are a tourist and wish to freshen up a bit before continuing your journey, you will find hot and cold water, liquid soap, sanitary towels, etc. You will also find a toilet here; and then there are comfortable chairs, a big couch to lay your baby on while you rest. Now all this is absolutely free to the women who wish to patronize it. Now as to the library. Anyone residing within what would be considered Polson's territory may have the benefit of the library by taking a card, \$1 per year for adults and 50 cents for children, and then complying with the rules in regard to the returning of books, etc. No charge is made for the use of the reference library or the magazines and papers.

Now, "Who is paying for this?" Forty dollars per month is paid by the city, \$35 of which pays the rent. A library



board of three members, who are Mesdames Cowman, Gray, and Lovinger, appointed by the mayor, approved by the council, are responsible to the city; and the Civic League with this library board has the responsibility of raising funds to keep the institution, which is away in advance of any town or city in this section of Montana, a going.

They employ the librarian who also serves as attendant in the rest room. Then there are many incidental expenses. Besides they are endeavoring to improve and add to the library.

To help out on these expenses was the first idea of holding the Saturday afternoon luncheons. But the good cheer and social side of bringing the women of country and town together is eclipsing the financial side, although the silver in the cup increases each week. Last Saturday Mrs. J. G. Dunbar and Mrs. David Davis were hostesses and there were many guests. This is also a busy day for Miss Fast, the librarian, as many country patrons are in on Saturday.

Next Saturday Mesdames Casey and Willis will entertain you, and the following Saturday Mrs. H. W. Douglas and Mrs. C. E. Wood will be hostesses.

If you don't take advantage of the hospitality of the rest room you are the loser, for you are welcome no matter where you are from.

M. J. COWMAN,  
*Chairman Library Board.*

The Chandler Woman's Club, Salt River project, Arizona, is to have a brand new clubhouse of its own. Dr. A. J. Chandler has donated a building site just opposite the new high school buildings and the women are actively engaged in raising funds. They already have nearly \$1,000.

The Artemesia Club, Newlands project, Nevada, has been making a student loan drive to raise funds to help worthy young people through the university. This work was inaugurated by the State Federation of Women's Clubs, and there are already 14 students going through the University of Nevada on funds thus provided. Three of them are from Churchill County, on the Newlands projects, yet until now there has never been a community effort made there to help swell the fund, although private contributions have been made by some of the citizens.

The movement the ladies of the Artemesia Club are taking up is purely a women's effort, and they desire to have every woman in the county contribute at least \$1 to the fund.

The student loan fund is a revolving fund that will never cease to work, for as soon as one student completes the university course another takes it up. It is expected that the ambitious young people who avail themselves of this opportunity will secure some employment that will help defray their expenses while going through the university. By this means \$25 a month for three years will take the student through, and then the process of returning the money begins and the next student takes it up. It is an endless chain that works admirably.

This method of assisting the young people to secure an education and giving them the opportunity of re-

paying the sums expended later on, entails sufficient responsibility to give a wonderful impetus for earnest work.

Rumor has it that in a certain section of the Newlands project some mysterious influence is at work among the boys, who, behind closed doors and away from the curious inspection of mere girls, are industriously engaged in sawing and hammering and drawing plans, while odors of new woods and paints drift tantalizingly through cracks and crevices.

It seems that a firm of public-spirited merchants in Fallon has offered valuable prizes to the boys who build the best bird houses and three competent judges will pass on the entries. The bird houses will be on display in the big show windows of the I. H. Kent Co., and at the close of the contest these merchants will sell such of the houses as their owners desire to part with, as there are a great many people who will be glad to secure homes for such birds as they can attract to their premises.

It is said that the Audubon Society, New York City, will furnish suggestions for building houses for various bird families.

In a recent issue of the Hermiston Herald, Umatilla project, Oregon, appeared a few news items from the town of Umatilla which are of more than passing interest. They tell how the Ladies' Home Bureau met with the Umatilla Commercial Association to take up several projects in which they are interested and to seek the cooperation of the men members of the association. Principally the ladies are boosting better streets, market roads, more trees for the streets, a park that will encourage tourist travel to stop and rest in Umatilla, drinking fountains, teachers' cottages, and many other improvements. The Herald says the men seemed to appreciate the "pep" displayed by the ladies to such an extent that it was voted to extend honorary membership to all the members of the home bureau, with full privileges and no dues. March 17 is the State-wide tree planting day and Umatilla celebrated by planting trees on the highway and the new park site. The ladies are also conducting a clean-up campaign, in which every resident and all the school children especially will take part. The work will be concluded with a celebration and picnic lunch.

Project papers these days are filled with notices of municipal clean-up campaigns, and the Williston Graphic, North Dakota pumping project, says that there are three unfailing signs of spring—the circus, the ball game, and the mobilization of soap and brushes in a house-cleaning campaign.

We are not responsible for the first two, though we enjoy them to the full. The third we are responsible for and as years go by we are learning that an active campaign for municipal cleanliness is a big factor in the public health.

Science has not yet invented a better germ killer than the old-fashioned whitewash brush.

Preventive medicine has not yet evolved from its scientific laboratories anything better as a wholesale germ killer than the spring bonfire to clean up rubbish from the back yards and vacant lots.

The cleanliness of a city is the measure of its modernity.

Let Williston's clean up and paint up campaign this spring be a record breaker.

Another project paper says that "paint up" necessarily goes hand in hand with "clean-up," because a clean-up without paint is useless and absurd. Houses that are unpainted eyesores are made uglier and more conspicuous when streets and grounds only are cleaned up. Because the painted surface, inside and outside, is washable and therefore can be kept clean and sanitary, and because, as Prof. H. H. King, of the Kansas State Agricultural College declares, after several years' experience in conducting painting tests for that State, "The annual loss through lack of painting is greater than the annual loss by fire," paint everything paintable. "Paint, paint your walls and floors and ceilings often," says Dr. Leonard Keene Hirshberg, A. B., M. A., M. D. (Johns Hopkins University), in his "Why it is Cheaper to Keep Well—Prevention the Way." Many cities in Europe and South America require regular painting, in prescribed colors, by city ordinance.

### A Handy Clothesline.

Place iron rings on buildings, trees, or posts by means of staples where you want your clothesline to end. Fasten harness snaps on the ends of your line, and you will only have to snap your line in place on wash days, and in case of a sudden shower the line, clothes, and all can be taken down in a few seconds by just unsnapping the line and keeping it taut if there is danger of soiling the clothes by touching the ground.

By this arrangement, too, you can avoid disfiguring your yard with the unsightly clothesline. This simple device is of most use in winter when, instead of chilling one's hands and tearing the frozen clothes, the line and all can be unhooked quickly and carried indoors, where the clothes may thaw before being removed.—L. L.

### HOW IRRIGATION HELPS YIELDS.

What irrigation does for yield per acre is expressed in the comparative results of an investigation made by the Colorado Crop Reporting Service. Corn production in 1919 in that State on irrigated land was 30.6 bushels per acre and on nonirrigated land 15.2 bushels; winter wheat, 24.7 and 9.3 bushels, respectively; spring wheat, 22.8 and 7.4 bushels; oats, 37.0 and 15.2 bushels; barley, 30.8 and 12.5 bushels; rye, 15.5 and 8.6 bushels; and potatoes, 155 and 34 bushels.

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### WINDBREAKS ON RECLAMATION FARMS.

By C. G. Bates, U. S. Department of Agriculture.

No farm is complete without trees. Especially in the regions and localities in which the Reclamation Service is creating farms out of desert, some special effort will usually be needed before any trees can be had. Natural growth, if present at all, will be confined to stream banks or the beds of dry creeks, and will usually not be in the situation which is desired for the homestead. It is obviously necessary both to the beauty and utility of the farm that trees should be planted in the early years of its occupation.

#### PLANT GROVE TO WINDWARD.

The first effort will ordinarily be directed toward supplying both shade trees and windbreaks for the immediate surroundings of the dwelling, barn, and cattle sheds. Except for a few yard trees carefully located and properly trained as they grow, a small grove on the windward side of the buildings will generally satisfy the immediate needs and will give the place a homelike appearance which can be secured in no other way. Such a grove, though covering only 2 or 3 acres, may serve the triple purpose of protection of all buildings from winter wind, of shelter for stock, and even for persons, from the burning rays of the summer sun, and ultimately to supply some fuel and wood for various articles which the farmer can better construct than purchase.



WITH PROTECTION FROM WIND A COW SHED NEED NOT BE VERY ELABORATE.



Later, as the more pressing work of building a farm becomes an accomplishment, most good farmers will consider the desirability of protecting the fields, by means of tree windbreaks, from drying winds and those which, either in summer or winter, may move the soil or remove some of its humus, which is such an important factor in fertility. Likewise windbreaks may be used to make pastures more comfortable for stock and hence more productive in the long run. These are in the nature of improvements gradually to obtain the fullest and most profitable use of the land.

The location of windbreaks must not be left to chance. For the protection of fields and pastures they will, naturally, follow division lines and may sometimes take the place of fences. In the location of the homestead grove, however, close study should be given to the effect which the grove may have on appearance, and also to securing the greatest utility. The direction of the winter winds should, perhaps, be considered first, and the location of both grove and buildings planned to obtain the maximum of protection from those winds which cause the greatest discomfort. Usually the house and barn should not be within the grove, but nestled close beside it. Cow sheds and feed lot may advantageously be surrounded on all sides or,

in other words, an opening in the grove may be large enough to permit free movement about sheds.

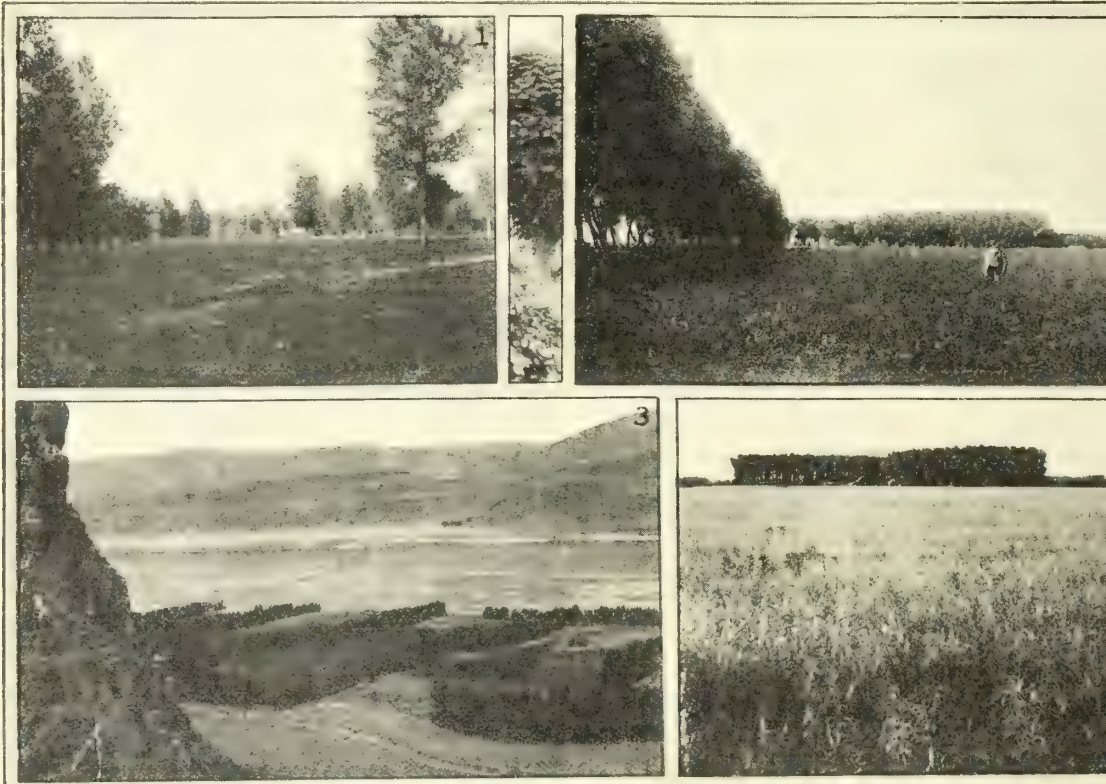
#### CULTIVATION HELPS TREES.

In starting tree growth, thorough cultivation of soil is of fundamental importance, whether irrigation will later be possible or not. Often the buildings of a grove will be located on the higher portion of a farm, which can not be watered. Because nature placed no trees on this land is not proof that they not grow. There is much evidence to show that continued cultivation creates favorable soil conditions for tree growth, which could not exist naturally.

Especially if the soil be fine and heavy and is underlain by another that might be called "hardpan," breaking of the sod should be followed by deep stirring. After this, the land may well be kept in thorough cultivation at least a year before trees are planted.

#### WHAT TREES TO PLANT.

The choice of the species to be planted, while mentioned last, is perhaps most important to success. As a general rule, only those species should be used which are native to the region and grow in its more favorable spots, and those "foreigners" which have been g



1. A pasture may profitably contain some trees, especially if it is irrigable. 2. Alfalfa field protected by row of cottonwoods. 3. Desert drifting sand made useful by windbreak planting. 4. This suggests the best possible location of trees and buildings for winter protection and summer shade.

a thorough try out at some experiment station near by or on a farm established many years previously. No ordinary farmer can afford to experiment with unknown and untried species, wasting 10 or 15 years only to be faced by complete loss of his effort. The species which may be used in different sections are so varied that no lists can be presented here.<sup>1</sup>

A very successful plan is to plant hardy, shrubby species on the edges of the grove, and especially on the windward side, reserving for the interior those species which may most truly be called forest trees, and which may be expected to attain the greatest height. By this arrangement the greatest mechanical effectiveness of the windbreak is secured.

## SUCCESSFUL WATER USERS.

### D. C. Hansen, Kennewick Unit, Yakima Project, Washington.

NOTE.—The following is Mr. D. C. Hansen's own story of one who has been waiting for several years for Government irrigation. His land lies under the Kennewick unit of the Yakima project, but was much more fortunately situated than most of the land in being adjacent to the river at a point where it was possible to develop power for pumping.

The wheel and transmission machinery, although crude, are none the less effective. The wing dam has to be replaced nearly every year at no small expenditure of time and labor.

The wheel, with Mr. Hansen's home, alfalfa, cornfield, and orchard constitute a real oasis in the desert, and comprise one of the interesting sights in the lower Yakima Valley, being clearly visible from the Northern Pacific and Oregon-Washington Railways, and from the Inland Empire Highway, about half way between Prosser and Kiona, on the south side of the Yakima River.—*R. K. Tiffany, project manager, Yakima project.*

I promised recently to outline briefly what our land produces here in this part of the famous and beautiful Yakima Valley.

I have worked in Iowa and farmed between the years of 1882 and 1887. Land then was worth \$25 per acre, improved. I then went to Fairmont, Minn., and bought 240 acres of raw land for \$7.75 per acre, improved it, and sold it 11 years later at \$47 per acre. We thought then it was an awful price, but the land now will sell at any time at \$250 per acre. The land in Ogden, Boone County, Iowa, where I worked and farmed for myself, sells for between \$400 and \$600 per acre.

After I sold my farm in Minnesota I came to Washington. One reason was the climate, which can not be beaten anywhere in the United States; but when I came here I invested my money in dry land and went broke; yes, worse than broke. Although we have A No. 1 rich soil and sunshine, the main thing I needed to make a success was rain or water. Well, we didn't get rain enough and I could not get Government water for irrigation. I waited and held on as long as I could in order to save myself and family from ruin, but had to quit. However, every cloud has a silver lining and so it was with me. I am a man who never gives up unless death makes me.

Three years ago I got this place that I am on now. I have 45 acres under irrigation that I water with my own pump driven by a water wheel from the water power in the river. The place had been rented before I got it. The renter was a good hard-working man, but as a rule a man who owns his place will see that things are kept up in better condition than the man who rents, that is, if he is a man and a real farmer; if not, he is worse than a good renter. And, by the way, a good renter is not a renter very long. He soon starts out for himself because this valley has great opportunities especially when the Government gets this dry land under irrigation and that is the only way our Government can get any benefit out of the land.



WHEEL AND PUMP; 48-FOOT LIFT, FURNISHING AN AVERAGE OF 400 GALLONS PER MINUTE.

When I came on this place three years ago the pumping plant was on the bum, proper. Some people called it a junk pile. Besides I had never done any irrigation and I was worse than broke. I owed every one I could owe, I had no horses, no harness, and no machinery, but I had the makings, and that was this rich and productive land and the water. To-day I can say I have made good. I have paid every one I owed with the exception of a small mortgage, and I have improved the farm \$1,400 worth with fencing and buildings. In addition, I have 4 good horses, 1 registered Holstein bull, 4 cows and 3 heifers, 90 chickens, some hogs and sheep.

<sup>1</sup> A more complete discussion of this subject may be found in Farmers' Bulletin 788, entitled, "The Windbreak as a Farm Asset," which may be secured from the Division of Publications, United States Department of Agriculture, free of charge.



We have about 800 pounds of hog meat in our smoke-house and plenty to eat of all good food, but, mind you, we worked, my wife and I, not 8 hours a day but 16. Now, however, we can take it a little easier and with all our hard work we were healthy and happy because we knew we had a bright future ahead of us.

We raise 6 tons of alfalfa per acre. Year before last I raised 115 bushels of corn per acre; last year I raised 98 bushels. I am going to put in 10 acres this year and I believe I can make 125 bushels. I weigh my corn and hay as I have a 6-ton Fairbanks & Morris scale. A little later I will try wheat as I have seen 65 bushels per acre here on corn land.

We have only 1 acre in fruit trees for family use so I can not say much about it, but I understand that people having apples, pears, peaches, cherries, etc., cleared over \$1,000 on bearing orchards 7 years old and up, and when it comes to strawberries and garden truck, they make twice that amount from what they tell me.

If the land in Iowa is worth \$500 per acre ours is worth \$1,000, so I think we can well afford to pay \$100 to \$150 per acre for a water right. Of course I am speaking of good land such as I mentioned or the land I own, and I would be only too glad to pay it if I could get Government water.

I am 53 years old and my wife is 50. What we have done others can do as the water is the main thing here with us. We have the rest and can furnish the balance; I mean the work.

#### Dan H. Williams, Tieton Unit, Yakima Project, Washington.

In 1911, Dan H. Williams, who up to that time had always lived in town, and had never done any farming, purchased 37 acres of sagebrush under the Tieton unit of Yakima project. He set 35 acres to apples, with peach and pear fillers, and in 1913 pulled out 300 of the peach trees. Last year he bought an additional 10 acres of apples, with pear fillers, that had been planted the same year as his original acreage. The varieties of apples grown are Winesap, Delicious, Rome Beauty, and Jonathan, about evenly divided.

His returns for 1919 from the two tracts were as follows:

8,139 boxes of apples, at \$2.25-----	\$18,312.75
5,452 boxes of peaches, at \$0.55-----	2,998.60
360 boxes Winter Nellis pears, at \$2.50 -----	900.00
48 tons Bartlett pears, at \$60-----	2,880.00
Total -----	25,091.35

These figures show a return per acre for apples alone of \$469.50, in spite of the fact that Mr. Wil-

liams top-grafted 250 Spitzenberg trees last year, so that no crop was produced by these trees. By way of comparison it may be stated that the total average return for apples on the Sunnyside unit for 1919 was \$457.72 and on the Tieton unit \$283.45.



DAN H. WILLIAMS.

Mr. Williams is a striking example of what can be accomplished by a man without previous farming experience if he has the necessary energy and stick-to-it-iveness. He is building this year a hollow-tile warehouse of sufficient capacity to store his entire crop.

#### Mr. and Mrs. Fred Rieks, Umatilla Project, Irrigon, Oreg.

Mr. Fred Rieks settled on his 20-acre tract in March, 1904. His capital was \$600, of which \$450 was used in payments down on his land. He values his farm, stock, and improvements to-day at \$7,000. In 1919, with only 12 acres cropped, the total value of his crop of alfalfa and fruit was over \$2,300. Sales of dairy and poultry products averaged almost \$100 per month.

Mr. and Mrs. Rieks have spent their lives farming. They never sell their hay, feeding it all. They cull their cows by weighing and testing the milk, and their

poultry by using the trap nest. Last fall three pure-bred Jersey heifers were purchased at a cost of almost \$1,000. The sand dunes have been made fertile by the application of tons of manure. A large head of water is used. Diversified farming has been followed and disaster did not result from the failures of one crop. They have been their own middle men and by honesty and square dealing have developed their own markets. Mrs. Riels has shared equally in the farm management and work. They frankly confess their indebtedness to the farm paper. They believe in the country, their project, and themselves.

### Mr. and Mrs. Joseph Dyer, Umatilla Project, Hermiston, Oreg.

Mr. and Mrs. Dyer and their daughter Phyllis came to the project in April, 1909. He had \$900 in capital. The value of his farm, stock, and improvements is conservatively estimated at \$10,000. He is building a \$6,000 home. The value of his 1919 crop was \$4,300 from 25 acres of fertile soil.



Previous to coming to the project, Mr. Dyer had worked at almost everything. His only farming experience was as a boy. He has practiced diversified farming. The specialties have been alfalfa, apples, strawberries, and Jersey cows. He is 62 years of age and a young man in spirit and energy. Mrs. Dyer and Phyllis have felt no embarrassment in turning from painting and music to farm tasks. Mr. Dyer says, "I've been in almost every State of the Union, in England, France, Germany, and Norway, and the Umatilla project is the best place on earth."

### Mr. and Mrs. P. P. Sullivan, Umatilla Project, Hermiston, Oreg.

Mr. and Mrs. Sullivan, with their family of five, settled on a project ranch of 20 acres in 1907. His initial capital brought from Iowa was \$6,000. He now owns 96 acres. From 71 acres cropped in 1919 he took crops valued at over \$6,000. His estimate of his present value is \$20,000. Mr. Sullivan was a miner from 14 to 25 years of age; since that time he has farmed.

Mr. Sullivan is a believer in the diversified farm and pure-bred stock. His farm products have included alfalfa, corn, and fruits of all kinds. His chief interest has centered around his dairy herd of 24 Jerseys. His milking machine and silo class him as a progressive dairyman. He is also raising hogs, sheep, horses, and poultry. His experience and knowledge are frequently in demand by project farmers when their stock troubles are serious. Mr. Sullivan is a public-spirited, broad-minded citizen and an unselfish neighbor. The chief reason for Mr. Sullivan's success is found in his own statement: "In the early days on the project, when it was necessary for myself and the boys to be away working on the ditches and elsewhere for others from early morning until after dark, we returned to find the cows milked and the chores done. My wife and girls have not been too proud to do a large share of the farm work."

### POSITION OF DIRECTOR OF RECLAMATION SERVICE CLASSIFIED.

The report of the Congressional Joint Commission on Reclassification of Salaries (H. Doc. 686, 66th Cong., 2d sess.), which was submitted to Congress recently, contains the following description of the duties and qualifications of the Director and Chief Engineer of the Reclamation Service.

**Duties.**—Under the general direction of the Secretary of the Interior, to serve as the executive head and chief engineer and have supervision of the administrative and technical work of the Reclamation Service in the investigation, design, construction, operation, and maintenance of irrigation projects in the arid States of the West, and to perform other related work.

**Qualifications.**—Training equivalent to graduation with a degree from an institution of recognized standing, with major work in civil engineering; extended professional experience in handling problems connected with hydraulics, water supply, river control, irrigation, and drainage, of which at least eight years shall have been of a character to give substantial evidence of knowledge and ability and of executive capacity of the highest order.

**Principal lines of promotion.**—From senior civil engineer; senior hydraulic engineer.

**Compensation for class.**—To be determined by the Congress.



## FARMSTEAD BEAUTIFICATION.

By F. L. Mulford, U. S. Department of Agriculture.

On reclamation projects there is no reason why such conditions should exist as are indicated in the first picture of each of the two sets shown herewith, especially when the growing of a few plants will help to make the great contrasts illustrated. Every farmer should have attractive surroundings in which to live because they can be secured with little more expenditure of time and money than is required in giving the usual care about one's place, and because attractive surroundings have a helpful influence far beyond what is usually appreciated. They tend to make those who live amid the beauty created more contented and others who see it are inspired and helped.

The first requisite for a really beautiful farmstead is good arrangement of the buildings with relation to one another and to the fields and roads. A little thought given to a proper arrangement of the buildings for future as well as present needs will repay one abundantly. Common sense must be used in planning for the farm work that must be done, instead of merely trying to make more show than "the Joneses."

A second requirement for achieving the most successful result in homestead beautification is that the

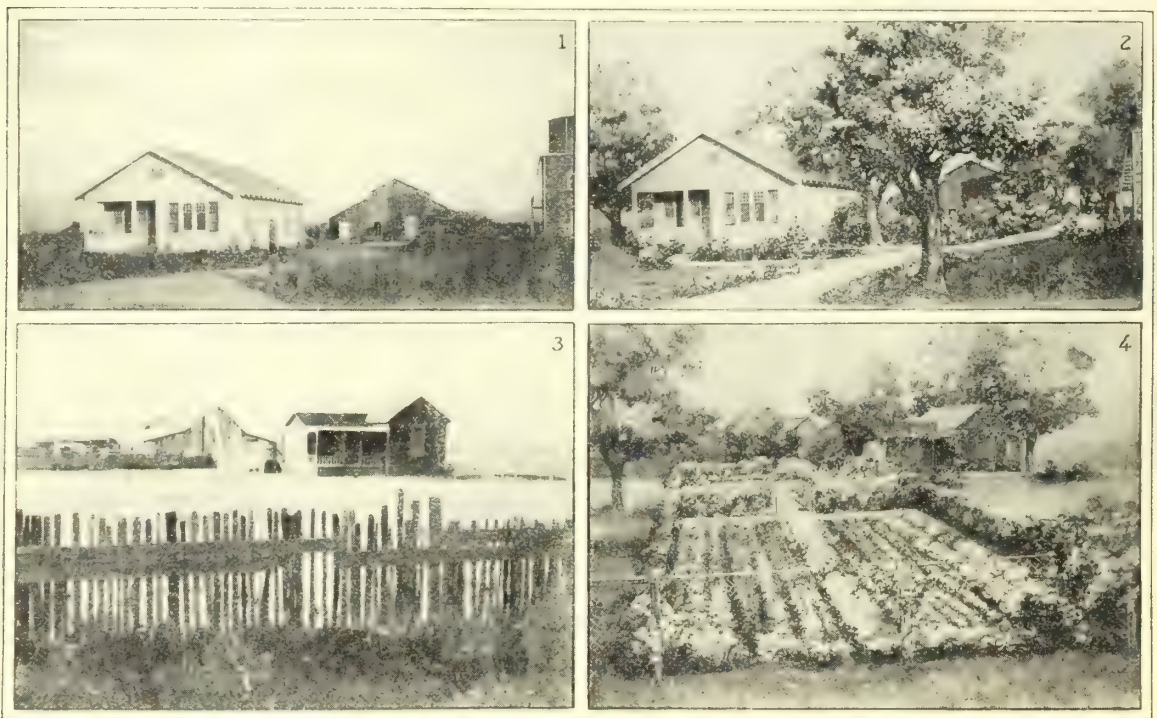
buildings themselves shall be proportioned to look well. This does not mean that they must be more expensively built than the more ugly ones, but they must be well proportioned. That is, the height, width, roof slope, overhang of the eaves, spacing of the windows, and other details in either house or barn must be suited to the other details of the structure.

### PLANTING COVERS UGLINESS.

Where buildings are already constructed in a way that is not attractive, sometimes an inexpensive change will make a wonderful difference in appearance. Where this can not be done plantings will have to be depended upon to disguise what is unattractive as well as to add to what is attractive.

Such a simple well-designed house as Figure 1 does not need to be hidden, but does require plants about it to make it look as though it were "at home" in its location.

After locating the buildings and designing them well, one of the most important steps is to locate the approach drive. It should take all visitors, strangers, neighbors, and home folks to the entrance door, not



1. Before any attempt has been made to beautify the homestead. 2. What eight years will do. The shrubs of course become full grown, or nearly so, in a much shorter time. Note the drive and walk. 3. A typical homestead in a new country. 4. What a little planting will do to the homestead shown in Fig. 3.

the kitchen door. It should permit callers to turn and get back to the highway without going into the work yard, and it should also permit business traffic to get to the barn without going too near the front door. Figure 2 gives an idea of one way to accomplish this.

After these things are arranged, trees should be planted to give shade and to make all buildings less conspicuous. There should be enough trees to partially hide the house and also the barn; enough to make shade on the lawn so the family may enjoy it. There should be enough shade near the barn, in the work yard, and in the paddock so that men and animals may have some use of it. The house itself should be protected from the mid-afternoon sun in summer and in cold countries all the buildings should be protected from the coldest winter winds.

#### GOOD TREES TO PLANT.

For shade only deciduous trees (those without foliage in winter) should be used, so that the house will be sure to get the benefit of full sunshine in winter. On reclamation projects the water problem is so far solved that not only can the trees be grown that succeed in the near-by dry farming areas (such as green ash, thornless honey locust, black locust, hackberry; and in the South, Mississippi hackberry), but also such trees as the American elm, English elm, mossy cup oak, red oak, basswood, European linden, sugar maple, and Norway maple. In many of the reclamation projects other trees can also be used. Where evergreens for lawn specimens or windbreaks are desirable, the Austrian pine, the native cedars, arbor vitae, and frequently many of the others listed in nursery catalogues may be used.

In addition to trees a very important part of home ground planting is shrubs in clumps about the foundation of the house to make it look at home; also on the boundaries to make them appear less straight and rigid; in the turn of drives and walks to help give a reason for not having them straight; about laundry yards and work yards to make them less obtrusive; and about the garden to give it more privacy and seclusion, as in Figure 4.

#### KINDS OF SHRUBS RECOMMENDED.

Among the many shrubs that will thrive where water may be given, are the many spiraeas of which some bloom in early spring and others in midsummer; others bloom between these periods. Several dogwoods will succeed, such as the early flowering small tree and others growing as bushes, some with bright-colored stems, and some with attractive berries. There are several viburnums found in the nursery catalogues—all attractive plants, most of them thriving both north and south, while a few would succeed only on the most southern projects. There are several wild roses that are fine for this use, and some introduced species

## CONCRETE BEAM TESTS, NORTHPORT UNIT, NORTH PLATTE PROJECT.

By W. H. Fisher, Assistant Engineer, North Platte Project.

Some interesting field tests of reinforced concrete beams were made on the Northport unit of the North Platte project during the summer and fall of 1919. These tests were made to determine the advisability of using local gravel found on this tract as a concrete aggregate for canal and lateral features. The nearest good river gravel involves a haul of about 6 to 8 miles, which it was desired to eliminate if possible by using creek gravel found closer at hand. This creek gravel was of somewhat questionable character due to its carrying approximately 20 per cent of its coarser aggregate in the form of sandstone pebbles, which it was thought might be too soft to develop adequate concrete compressive and bond strength. There was little or no question as to the quality of sand which the pit-run material contained as it appeared to be all of good, hard, sharp material.

The available cost data at hand show that with the existing cost of labor, the cost of sand and gravel haul in this vicinity is about 75 cents per cubic yard-mile. By using the local gravel deposits which are found in the Northport unit, it is estimated that the average length of haul for the work considered would be about 3 miles, as compared with a 7-mile haul if river gravel were used. The total estimated quantity of gravel required on all work considered is in the neighborhood of 8,000 cubic yards, so that the 4 miles of haul eliminated on this quantity of gravel would mean a total saving of about \$24,000, a sum well worth considering. The cost of all experimental work done in connection with the beam tests here described was \$360, or 1.5 per cent of the saving involved.

In making these tests it was decided not to use any refined or laboratory methods in either the manufacture or testing of beams as it was desired to duplicate field methods ordinarily used in structure work as far as possible, so that a more accurate index of the actual strength of concrete ordinarily used in structures would be available. In all of the beams tested the pit-run material was screened and remixed in pro-

(Continued on page 176.)

that are also good. In the flower gardens the hybrid tea roses will thrive in the south and the hybrid "perpetuals," pretty well north. There are many other shrubs advertised by nurserymen in a corresponding latitude as far east as the Mississippi Valley that could be used.

Those interested in beautifying their home surroundings can get more detailed information in Farmers' Bulletin 1087, of the United States Department of Agriculture, on "Beautifying the Farmstead."



### Concrete Beam Tests.

(Continued from page 175.)

portions of 1:2:4 or 1:2½:5. The cement used was standard tested Portland cement. The pit-run material as found averaged about 50 per cent fine material under one-fourth inch, with the coarser material running from this size up to 1¾ inches average diameter. Some few stones were slightly larger than this, however. Material was screened for sand under one-fourth inch, but not for the coarser limit, everything above one-fourth inch being considered as coarse aggregate.

All beams tested had the following outside dimensions: Length 7 feet, width 8 inches, depth 4½ inches. The effective depth of beams was 3 inches, the reinforcing steel being placed with center of bars 1½ inches from bottom of beam. The reinforcing steel for each beam tested consisted of four one-half inch square cold twisted steel bars, spaced uniformly across the plane of effective depth, at 1½ inches spacing between bars set accurately by means of a templet. The effective depth of beams was purposely made small and the percentage of reinforcing large so that the beams when tested to destruction would all show concrete failures in compression instead of steel failures in tension, so as to secure the desired data as to ultimate concrete strength. The screened sand, gravel, and cement used were all proportioned by dry volume, one sack of cement being considered a cubic foot. The mixing was done in a one-third yard batch mixer such as is ordinarily used on smaller jobs. No attempt was made to gauge the water to any fixed percentage basis, the mix being judged by "eye" method alone to secure a medium wet mix. This lack of accurate water measurement would in itself preclude the making of any exact analyses of the results. It is, however, in accordance with ordinary field practice used on smaller jobs where the expense of using more accurate detail methods is usually greater than the net returns from the economies so effected.

The beams were cast in rectangular wooden boxes made of 2-inch lumber, the sides being removable, and each beam during the curing process was left on the plank base on which it was originally cast, to prevent any cracks due to handling. Some of the beams were covered with sand after having been cast; others were not so covered, but were purposely left exposed to weather which at this season was hot and dry. The object was to determine the relative loss of strength due to exposure to the hot, dry atmosphere while the beams were curing. In this connection it must be admitted that this treatment as regards such thin, narrow beams was far more severe than would usually occur in even thin slab work which would usually have much wider dimensions, possibly resting on a ground surface so that the deterioration due to drying out would probably be less than that shown by the beam tests.

In all, 24 beams were tested, 12 each at 30 and 90 days age. Of each series of 12 beams, 6 were of 1:2:4 mix and 6 of 1:2½:5 mix, and of each series of 6 beams, 3 were covered with sand while curing and 3 were left exposed to weather.

All beams were tested to destruction in the following manner: End supports were set 6 feet apart and consisted of 1½-inch diameter iron pipe resting on a solid timber block which in turn was well bedded on the ground surface. The supports were carefully leveled both longitudinally and transversely. The beam was then placed on the supports with a 6-inch overhang at each end of the beam, leaving a net span of 6 feet. The load was applied at the third points of the span by the use of a wooden platform bearing on two 1½-inch iron pipes. These iron pipes rested directly on top of the beam surface at the third points of the span as above indicated. Each pipe was given a thin sand bearing on the beam surface so as to distribute the load more uniformly and eliminate undue local stresses due to slight irregularities of the beam surface.

The applied load consisted of sacks of cement placed symmetrically on the loading platform. The average weight of a sack of cement proved by tests to be approximately 90 pounds and this weight was assumed to be constant for all loads used. Due care was used to avoid any impact shock on the beam as the load was being applied. The weight of the loading platform as well as the weight of the beam itself were, of course, taken into account in computing the stresses developed. A careful watch was kept for first cracks as the load was applied, but as the nature of the tests was such as to insure a compression failure in all cases the bottom cracks which appeared first were of little interest, merely indicating that the concrete below the reinforcing steel had reached its tensile limit. On the other hand, there were seldom any indications of top cracks until the final ultimate load had been applied, so that as far as these tests were concerned the appearance of first cracks was of little relative importance.

In computing the concrete ultimate strength of beams the parabolic theory of stress deformation for ultimate loads was used as given in Hool and Johnson's Concrete Engineer's Handbook, page 279, and the following assumptions were made as to certain working data used in the formulæ:

$n$ =Ratio of moduli, steel to concrete=15.

$A_c$ =Effective area of concrete=24 square inches.

$A_s$ =Steel cross-sectional area=1 square inch.

$p$ =Steel ratio=1/24=0.0417.

$k$ =Ratio of neutral axis depth to effective depth of beam (by formula)=0.723.

$j$ =(1-⅓ $k$ )=0.729.

$b$ =Beam width=8 inches.

$d$ =Beam depth (effective)=3 inches.

$F_c$  = Maximum compressive unit stress in concrete.

$F_s$  = Unit tensile stress in steel reinforcement.

$M_c$  = Total bending moment resisted by concrete at time of beam failure.

Substituting the above values in the formulæ referred to the following relations are obtained:

$M_c = 25.3 F_c$ , or  $F_c = \frac{M_c}{25.3}$ , and  $F_s = 11.53 F_c$ , which

are applicable, of course, only to ultimate load conditions.

All beams tested failed either under one, or between the two one-third points of the span, so that the bending moment due to all external loads was equal to 12W (inch-pounds) where W is the total external load. The bending moment due to the weight of the beam itself would theoretically vary between the third points of the span by not more than 1 per cent of the total ultimate bending moment resisted. This variation was neglected in all cases and the bending moment due to the weight of the beam assumed as constant and equal to that occurring at the center of the span; that is, equal to 1,980 inch-pounds, which is additive to the external load-bending moment above described.

The tabulated results of beam tests show all the essential factors involved and the computed steel and concrete stresses at ultimate load, also a column giving the nominal factor of safety that would obtain under given conditions. This nominal factor of safety has been obtained by dividing the total load at which failure occurred by that nominal load for which the beams would ordinarily have been designed, using the straight-line formula of stress deformation and with assumed unit working stresses of 520 pounds per square inch for 1:2½:5 concrete and 650 pounds per square inch for the 1:2:4 concrete. These unit working stresses correspond to those recommended for a good gravel concrete at 28 days of age, by the Special Committee on Concrete and Reinforced Concrete of the American Society of Civil Engineers. Results of tests are shown in the accompanying table.

On nearly all these tests, the failure was in the mortar or mortar bond on gravel except in those tests showing an ultimate stress near 2,000 pounds per square inch where a few of the sandstone pebbles before mentioned were sheared. This shows that as far as quality of coarse aggregate is concerned, suitable concrete would be made from this gravel for any and all required structures. All beams that failed at the lower unit concrete stresses, judging from indications at the point of fracture, seemed to carry a larger percentage of the coarsest aggregate than those which failed at the higher unit stresses. This was to be expected since on such thin slabs the finer aggregate would naturally develop higher strengths than the coarser aggregate. On all beams that were left exposed to weather while curing there was evi-

dence of the concrete having dried out too rapidly, as shown by the greater percentage of mortar bond failure on gravel in those beams.

There was no evidence in any of the tests that failure had occurred by failure in shear or diagonal tension. All the failures were evidently due to crushing of concrete near the top center of beam, and there was no evidence of cracks extending along the plane of reinforcing steel to either side of the point of failure. As the effective depth of the beams was very small compared with the net span, there was relatively a much smaller chance of failure due to diagonal tension or shear than if the relative effective depth of the beams had been greater.

*Concrete beam tests, Northport unit, North Platte Project, Nebr.-Wyo. Tests on Indian Creek gravel, 1919.*

Beam test No.	Concrete mix-ratio.	Beam age.	Treatment of beam while curing.	Ultimate strength test data.				Nominal factor of safety. <sup>1</sup>
				Total external load.	Ultimate bending moment.	Computed steel stress per square inch.	Computed concrete stress per square inch.	
				<i>Pounds.</i>	<i>Inch-lbs.</i>	<i>Pounds.</i>	<i>Pounds.</i>	
1	1:2½:5	30	Exposed.	1,810	23,700	10,800	937	2.3
2	...do...	30	...do...	2,170	28,020	12,780	1,108	2.7
3	...do...	30	...do...	1,360	18,300	8,340	723	1.7
4	...do...	30	Covered.	2,530	32,340	14,750	1,279	3.2
5	...do...	30	...do...	2,600	33,180	15,220	1,320	3.3
6	...do...	30	...do...	2,500	31,980	14,590	1,263	3.2
7	...do...	90	Exposed.	2,250	28,980	13,220	1,145	2.8
8	...do...	90	...do...	2,610	33,300	15,200	1,317	3.3
9	...do...	90	...do...	2,330	29,940	13,670	1,183	2.9
10	...do...	90	Covered.	3,420	43,020	19,630	1,702	4.3
11	...do...	90	...do...	3,850	48,180	22,000	1,905	4.9
12	...do...	90	...do...	3,240	40,860	18,630	1,614	4.1
13	1:2:4	30	Exposed.	2,260	29,100	13,280	1,150	2.3
14	...do...	30	...do...	2,170	28,020	12,780	1,108	2.2
15	...do...	30	...do...	1,990	25,860	11,800	1,022	2.0
16	...do...	30	Covered.	3,060	38,700	17,650	1,530	3.1
17	...do...	30	...do...	4,060	50,700	23,120	2,030	4.1
18	...do...	30	...do...	3,090	39,060	17,820	1,544	3.1
19	...do...	90	Exposed.	2,250	28,980	13,220	1,145	2.3
20	...do...	90	...do...	3,250	40,980	18,700	1,620	3.3
21	...do...	90	...do...	3,240	40,860	18,620	1,614	3.3
22	...do...	90	Covered.	4,060	50,700	23,150	2,005	4.1
23	...do...	90	...do...	4,670	58,020	26,480	2,295	4.7
24	...do...	90	...do...	3,850	48,180	21,980	1,905	3.9

#### AVERAGES ON ABOVE RESULTS

1-3	1:2½:5	30	Exposed.	1,780	23,340	10,650	923	2.2
4-6	...do...	30	Covered.	2,543	32,500	14,850	1,285	3.2
7-9	...do...	90	Exposed.	2,397	30,780	14,050	1,216	3.0
10-12	...do...	90	Covered.	3,503	44,020	20,100	1,741	4.4
13-15	1:2:4	30	Exposed.	2,140	27,660	12,620	1,093	2.2
16-18	...do...	30	Covered.	3,403	42,820	19,520	1,700	3.4
19-21	...do...	90	Exposed.	2,913	36,940	16,850	1,460	2.9
22-24	...do...	90	Covered.	4,190	52,300	23,850	2,068	4.2

<sup>1</sup> See foregoing descriptive matter for explanation.

These tests were conducted under the direct supervision of R. B. Diemer, assistant engineer, in charge of the Northport construction work for the U. S. Reclamation Service, assisted by the writer.

Although it is realized that these tests are of little value as furnishing a criterion of probable concrete stresses to be expected with any other gravel than that used in these tests, or under different conditions of manufacture, nevertheless the tests point to



some interesting conclusions which may be considered as being of more or less general application.

#### CONCLUSIONS.

1. In all cases a marked increase of strength was shown by those beams covered with sand while curing as compared with beams of the same age and mix that were left exposed to the weather. This is, of course, to be expected and is generally well known. The increase of strength due to covering beams while curing, by the above tests varied from 40 to 55 per cent.

2. The 1:2½:5 beams covered while curing, for both 30 and 90 day tests, were stronger than the 1:2:4 beams of the same age that were not covered while curing.

3. Where concrete dries out too quickly after being placed there is a marked decrease of strength shown; due largely to failure of mortar bond on the coarser aggregate.

4. Considering the rough field methods used in making these tests, taken as a whole they give rather logical results, and fully answer the requirements for which the tests were made.

### AN UNUSUAL BRIDGE ON THE RIO GRANDE PROJECT.

By D. C. McConaughy, Assistant Engineer, Designing Department, Denver Office,  
U. S. Reclamation Service.

The Garfield Flume bridge, which carries the Garfield Canal across the Rio Grande, is a rather unusual type of structure, its novelty lying in the application of the cantilever principle to spans of short length. The bridge is 800 feet long and consists of four cantilever spans of 125 feet and 5 suspended spans of 52 feet, the piers being approximately 93 feet 6 inches on centers.

There is nothing unusual about the general type of structure, exactly similar arrangements having been frequently employed. It is, however, generally considered that this type of construction is not economical for spans of less than the upper limit of simple span trusses.

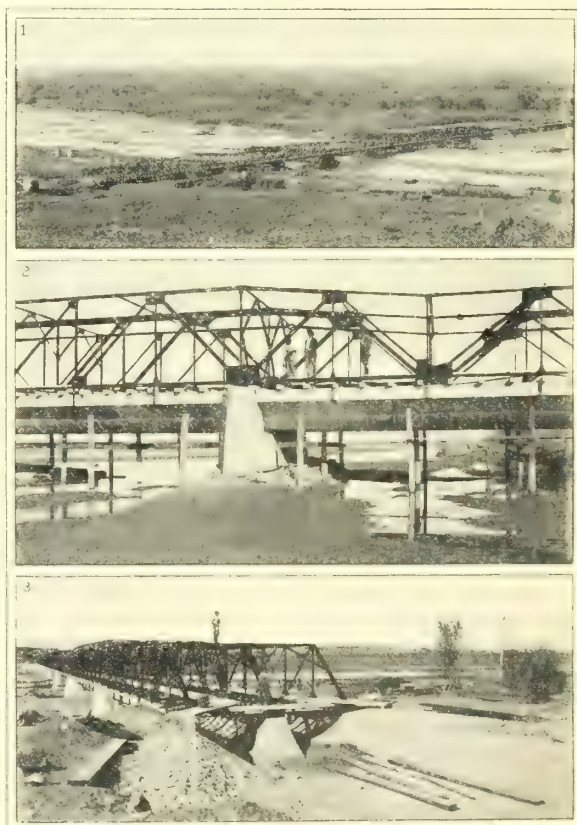
The bridge in question was designed late in 1916 at a time when current prices made a steel overhead crossing considerably cheaper than a concrete siphon. It supports twin No. 156 galvanized steel flumes carrying a total discharge of 350 cubic feet per second. A single flume of larger size would have reduced the cost considerably but was out of the question on account of the limited clearance available above high water.

Estimates were prepared for the usual type of structure, i. e., two simple span trusses with the inside edges of the flumes supported by floor beams, but on account of the length of beam necessary, the amount of metal required for the floor beams was considerably more than was required for an extra truss, and it was decided to use three trusses per span.

In an attempt to reduce the weight still further it was then decided to prepare an estimate for the cantilever type.

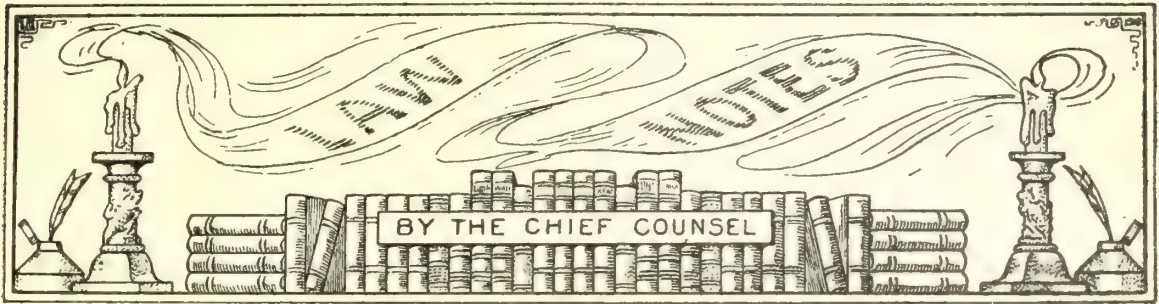
This estimate showed a saving of approximately 12 per cent as compared with the simple truss spans. The objections usually made against a cantilever are its lack of rigidity and excessive deflection, neither of which is especially important in the case of a flume bridge where the load is practically a uniform dead load. The three-truss cantilever type was therefore adopted.

In the advertisement, bids on alternate designs were requested, the only limitation made being the size of the flume and the invert grade. Proposals were received from eight bidders, two of the bidders



1. General view. 2. Hinge at junction of suspended span and cantilever arm and details of flume suspension. 3. Suspended span at abutment.

submitting bids on simple trusses as an alternate design, and one on a cantilever type with a slightly different arrangement of spans. The three lowest bids were on the cantilever type of structure.



### Court Upholds Construction Charge of \$75 for Yuma Project.

United States District Judge William H. Sawtelle, on February 26, 1920, handed down a final decree dismissing the suit instituted by the Yuma County Water Users Association against project officials of the Yuma irrigation project in Arizona and California.

This suit was brought to contest the right of the Secretary to announce a construction charge of \$75 per irrigable acre for the second unit of the Yuma project under public notice dated April 6, 1917. One of the main points raised by the plaintiffs related to a letter by the Secretary, dated May 10, 1904, which letter plaintiffs claimed fixed the maximum liability of the water users at \$35.28 per irrigable acre. The plaintiffs also contended that inasmuch as the contract with the water users' association provided that the first payments should not begin until the project was completed, public notice was not properly issued, as the project was still incomplete. The Government insisted the project was complete, that the letter was not a public notice, and that the water users must pay the cost of construction, which was announced by the notice of April 6, 1917. The decision of Judge Sawtelle sustains these contentions of the United States.

The case was tried in the District Court of the United States for the District of Arizona, at Tucson, Ariz., beginning April 28, 1919, and was submitted after oral argument on May 3, 1919. The plaintiffs appeared by Thomas D. Molloy, while the United States was represented by Thomas A. Flynn, United States attorney; Will R. King, chief counsel of the Reclamation Service; and Oliver P. Morton and Richard J. Coffey, district counsel of the Reclamation Service.

It is probable that the plaintiffs will take an appeal to the Circuit Court of Appeals.

### Rights of Appropriator Not Enlarged by Others' Improvements.

When appropriation of water of a stream is made, the rights of the appropriator are limited to the natural condition of the stream at the time, and are not enlarged by subsequent improvements made by another

which increase the supply flowing in the stream, and, if such other person himself increases the available supply, he has a prior right to use it to the extent of the increase; but the increase must constitute a new or independent source of supply. (*State ex rel. Zosel v. District Court of Third Judicial Dist. et al. (Montana)*, 185 Pac., 1112.)

### The Leasing Act of February 25, 1920.

Under the provisions of the leasing act of February 25, 1920 (41 Stat., —), it is expected that several million dollars will be transferred to the reclamation fund in the near future, and that a like sum will be added to that fund annually for an indefinite period.

This act authorizes the Secretary of the Interior to lease public lands for the mining of coal, phosphate, oil, oil shale, gas, and sodium. The public domain in national forests is included, except lands in the Appalachian forest (act Mar. 1, 1911, 36 Stat., 961), and lands in national parks. Lands withdrawn or reserved for military or naval purposes are not included except in certain cases. Lands withdrawn under the act of June 17, 1902 (32 Stat., 388), come within the terms of the act.

Permits and leases may be granted to citizens of the United States, associations of such citizens, corporations organized under the laws of the United States, or of any State or Territory, and to aliens who are citizens of countries which grant like privileges to citizens of this country. Municipalities may acquire permits or leases for coal, oil, oil shale, and gas.

The Secretary has the right to reserve the surface of the land for other disposition, in as far as it is not necessary for the use of the lessee in extracting and removing the mineral deposits therein.

The law provides that each lease shall contain provisions for the exercise of reasonable diligence, skill, and care in all operations, and to insure the safety and welfare of workers and the prevention of undue waste; also to provide for the sale of the product to the United States and to the public at reasonable prices.

The act contains a large number of provisions upon limitations of areas, restrictions on leases, duration of permits and leases, past production, royalties and rentals, and minor regulations of various kinds.



Subject to certain exceptions, 70 per cent of the revenues under this act from past production, and 52½ per cent of the revenues from future production are paid into the reclamation fund. A part of the revenue is paid to the States for roads and schools and a part is deposited in the General Treasury as "miscellaneous receipts."

Regulations to carry the act into effect were approved by the department March 11, 1920 (Circulars 671 and 672). Copies may be obtained from the Commissioner of the General Land Office.

### **Damages from Breaking of Reservoir.**

The owner of an artificial reservoir in no way constituting a nuisance, having been negligent in no respect, is not liable for injury to land below by breaking out of waters through an extraordinary and unprecedented flood. (*Sutliff v. Sweetwater Co. et al. (California)*, 186 Pac., 766.)

### **Bridges Across Irrigation Ditches.**

An oral license to a landowner by an irrigation company to bridge its ditch, when acted upon and fully executed, became irrevocable. Where a landowner had permission from an irrigation company to bridge its ditch, the bridge constructed by him was rightfully in position until such time as its alleged interference with the flow of water in the ditch could be legally determined, and it could not be removed by the company on its own motion arbitrarily and by force and violence. (*Northern Colorado Irr. Co. v. Reuter. (Colorado)*, 186 Pac., 286.)

### **Rights Between Upper and Lower Appropriators.**

A lower appropriator has no right to compel one who has taken out water above him to maintain an excessive use of water so that the former may get the benefit of the surplus, although the upper appropriator has permitted the lower appropriator to construct a ditch on his land to convey surplus waters. (*Tyler v. Obiague et al. (Oregon)*, 186 Pac., 579.)

### **California Irrigation Districts Not Municipal Corporations.**

An irrigation district is not a "Municipal corporation" and hence a public utility district, created under act of May 27, 1915 (St. 1915, p. 866), which included only a part of an irrigation district did not divide a "Municipal corporation" as prohibited by section 1 of such act. (*Randolph et al. v. Stanislaus County et al. (California)*, 186 Pac., 625.)

### **Water Appropriation Not Dependent on Land Title.**

A water right acquired by an appropriation and beneficial use upon land in the quiet possession of the appropriator, and upon which he has made valuable

improvements and reclaimed in part, is not dependent upon the title to the soil upon which the water is used, in view of Revised Statutes (United States) section 2339, L. O. L. sections 6534, 6561, section 6594, as amended by Laws 1913, page 273, and section 6596, and Laws 1913, page 531. (*Laurance et al. v. Brown et al. (Oregon)*, 185 Pac., 761.)

A right to the use of water upon vacant lands upon the public domain may be initiated by securing from the state engineer a permit therefor, and when the application for such permit is bona fide, coupled with a present intention to apply to a beneficial use the water thus sought to be appropriated and if the water is so applied during the period limited by the permit, the appropriation is then complete and valid, and relates back to the date of the permit, without regard to whether the permit holder was at the date of said application in any way connected with the legal title to the land upon which he proposed to apply the water. (*Sarret et al. v. Hunter et al. (Idaho)*, 185 Pac., 1072.)

### **Supplemental Contract Based Upon Forbearance to Sue.**

Where the Government has fully discharged its obligation under a contract, an agreement by the contractor to remise, release, and discharge the Government from all claims arising under said contract is not a valuable consideration passing from the contractor to the Government that will support a supplemental contract under which the contractor is to receive additional payment for performance of the contract work. Neither is the implied promise to forbear suit or other legal proceeding a sufficient consideration for such supplemental contract. (*In re Hoyt Hayden, Shoshone project*, 26 Compt. Dec., 328.)

Where a contractor under a Government contract is performing the contract work through subcontractors who throw up their subcontracts, thus delaying the work and necessitating its completion by the contractor under war-time conditions, at increased cost, the increased cost is due to default of the subcontractor and there is no legal liability resting upon the Government to pay the amount of the additional cost to the contractor. (*Idem.*)

### **Sale of Water from Federal Irrigation Projects for Miscellaneous Purposes.**

An Act For furnishing water supply for miscellaneous purposes in connection with reclamation projects. (Act Feb. 25, 1920, Public No. 147, 41 Stat. —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the Secretary of the Interior in connection with the operations under the reclamation law is hereby authorized to enter into contract to supply water from any project irrigation system for other purposes than irrigation, upon such conditions

of delivery, use, and payment as he may deem proper: *Provided*, That the approval of such contract by the water users' association or associations shall have first been obtained: *Provided*, That no such contract shall be entered into except upon a showing that there is no other practicable source of water supply for the purpose: *Provided, further*, That no water shall be furnished for the uses aforesaid if the delivery of such water shall be detrimental to the water service for such irrigation project, nor to the rights of any prior appropriator: *Provided, further*, That the moneys derived from such contracts shall be covered into the reclamation fund and be placed to the credit of the project from which such water is supplied.

### Congressional Bills of Interest to Our Readers.

#### IN THE SENATE.

*S. 3942*.—"A bill to encourage the development of the agricultural resources of the United States through Federal and State cooperation, giving preference in the matter of employment and the establishment of rural homes to those who have served with the military and naval forces." Introduced February 18, 1920, by Senator Duncan U. Fletcher, of Florida. This bill is a revision of the Chamberlain Smith bill of the Sixty-fifth Congress. (See H. R. 12649.)

*S. 3965*.—"A bill to authorize advances to the reclamation fund and for the issue and disposal of certificates of indebtedness in reimbursement therefor, and for other purposes." Introduced by Senator Chas. L. McNary, of Oregon, February 25, 1920.

*S. 4013*.—"A bill to amend the land leasing act of February 25, 1920." Introduced by Senator Joseph E. Ransdell, of Louisiana, March 3, 1920.

#### IN THE HOUSE.

*H. R. 12537*.—"A bill to provide for an examination and report on the condition and possible irrigation development of the Imperial Valley in California." Introduced by Representative M. P. Kinkaid, of Nebraska, February 14, 1920.

*H. R. 12649*.—"A bill to encourage the development of the agricultural resources of the United States through Federal and State cooperation, giving preference in the matter of employment and the establishment of rural homes to those who have served with the military and naval forces." Introduced February 20, 1920, by Representative Addison T. Smith, of Idaho. This bill is a revision of the Chamberlain-Smith bill of the Sixty-fifth Congress. (See S. 3942.)

*H. R. 12772*.—"A bill to give preference right of employment on construction work on United States reclamation projects, and preference right of entry on the public lands within such projects, to honorably discharged soldiers, sailors, and marines." In-

troduced by Representative Addison T. Smith, of Idaho, February 26, 1920.

*H. R. 12952*.—"Bill to provide employment and rural homes for those who have served with the military and naval forces of the United States during the war between the United States and Germany and her allies through the reclamation, acquisition, and development of lands to be known as the national soldier settlement act." Introduced by Representative N. J. Sinnott, of Oregon, March 6, 1920.

*S. 3138*.—"An act authorizing the Secretary of the Interior to sell and convey to the Great Northern Railway Company certain lands for stockyards, and for other purposes, at Browning Station, in the State of Montana." Passed the Senate February 2, 1920.

—Will R. King.

### RECLAMATION 'ABROAD.

#### Notes From Commerce Reports.

##### Irrigation Projects in Egypt and the Sudan.

The projects for the regulation of the water of the upper Nile include the construction of irrigation works on the White and Blue Nile and the regulation of the lakes. The improvements are intended to provide the water necessary to enable both Egypt and the Sudan to develop their agricultural possibilities to the utmost. The commission to examine these projects consists of an irrigation engineer nominated by the Indian Government, a British physicist nominated by the University of Cambridge, and an irrigation engineer nominated by the American Government (Mr. H. T. Cory, consulting engineer, U. S. Reclamation Service). The commission is to report on three heads: (1) After examination, on the physical data involved in these projects; (2) the manner of apportioning water between Egypt and the Sudan; (3) proper apportionment of expense to be borne by Egypt and the Sudan.

##### Northeastern Brazil.

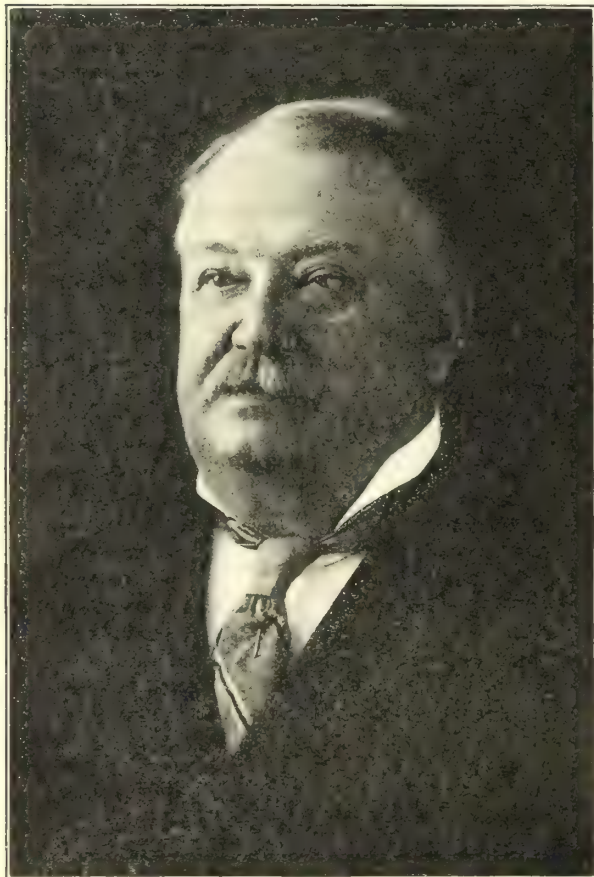
The Brazilian Congress on December 25, 1910, granted the recent requests made by President Pessca regarding the reclamation of the arid lands in northeastern Brazil. An outline of this project was published in the RECLAMATION RECORD for December, 1919, and all points reported at that time have been provided for in the recent decree. The Government is authorized to draw up regulations for the management of the special fund referred to in section 2 of the outline, as well as for the collection of taxes and the payment of water rights. The decree especially provides that all contracts for irrigation work, dams, and highways in connection with the project shall be given the greatest publicity. Dr. Miguel Arrojado Lisboa,



one of the best-known engineers in Brazil, has been appointed inspector in charge of this branch of the Government service and will have direct charge of the drought-prevention work.

#### BRIG. GEN. WILLIAM L. MARSHALL RESIGNS.

Brig. Gen. William L. Marshall, who for many years has held the responsible position of consulting engineer to the Secretary of the Interior, has tendered his resignation, on account of ill health, effective February 29, 1920.



BRIG. GEN. WILLIAM L. MARSHALL, RETIRED.

Gen. Marshall's work has been largely in connection with the Reclamation Service, and the esteem in which he is held is indicated in the following letter sent to him by Director Davis:

DEPARTMENT OF THE INTERIOR,  
UNITED STATES RECLAMATION SERVICE,  
Washington, D. C., March 3, 1920.

Brig. Gen. WILLIAM L. MARSHALL, U. S. A. (retired),  
2015 Kalorama Road, Washington, D. C.

MY DEAR GEN. MARSHALL: I have just received a carbon copy of a letter from the Secretary of the In-

terior to you from which I learn that you have presented the Secretary with your resignation and that it has been accepted.

I very deeply regret that the condition of your health does not enable you to continue your duties, which were mostly with the Reclamation Service, but I hope that you will be blessed with a speedy recovery from your illness.

I wish to take this opportunity to express to you my very deep appreciation of your valuable services during the past 10 years, and especially those in connection with the project charge investigations and other disputes in which you have rendered such excellent public service. Your reputation and prestige have lent more weight to your opinions than would have been given those of anyone else, and these have always been on the side of right and justice and have been characterized by logic and courage that made them invincible.

There can be no question that the Reclamation Service is on a very much more solid and secure ground and has a much brighter future before it than it would have had without your services. Valuable as your life has been, I feel sure that no other public service to your credit exceeds this, and you are entitled to the gratitude of the entire country and especially to that of the engineers of the Reclamation Service.

With best wishes for the early recovery of your health, I remain,

Yours, sincerely,

A. P. DAVIS.

#### CHANGES IN PROJECT MANAGERS.

During a recent period of one month the Service lost three project managers, who resigned to take positions with private organizations.

On the Huntley project, Montana, R. H. Fifield is succeeded by W. M. Green.

On the Shoshone project, Wyoming, A. H. Ayers is succeeded by J. S. Longwell.

On the Flathead (Indian) project, Montana, F. T. Crowe is succeeded by E. A. Moritz.

Keeping physically fit is the first rule to be observed in keeping well. Exercise is necessary to health.

What every farmer needs most is a hired man with a good reliable self-starter and at least one speed forward and not so many reverses. An accelerator might help some.

F. L. CAVIS LEAVES SERVICE.

On March 16, 1920, Mr. F. L. Cavis, chief accountant of the Reclamation Service, resigned to accept the position of chief accountant with the Miami Conservancy District, Dayton, Ohio.

Mr. Cavis was born in Marysville, Ohio, December 23, 1879. He was educated in the common and high schools of Marysville and in the commercial school at Boise, Idaho.

During the Spanish-American War he served for six months in the First Ohio Cavalry and for three



F. L. CAVIS.

years in the Regular Army during the Philippine insurrection.

Mr. Cavis was first employed by the Reclamation Service as a stenographer in the office at Boise, Idaho, in 1904, being promoted to the position of chief clerk, in which position he served until August, 1915, when he was assigned as examiner of accounts. Six months later he was appointed chief accountant of the Service, with headquarters in Washington, D. C.

Mr. Cavis leaves the Service with the best wishes of the officials and his fellow workers for continued success in his chosen profession. Under his leadership the accounting department of the Service has

ELECTRICITY AND HOME BUILDING.

The Minidoka Electric Project a Shining Example.

Farming is supposed to be a suntime business, an occupation that is carried on according to the amount of daylight available. Witness the recent altercation over the matter of daylight saving. And, of course, it is true that the farmer is dependent to a great extent upon daylight for the completion of his field work.

During the busy season he must be in the fields at daybreak and must stay there until dark if he is to get the necessary amount of work done. Before and after these field hours he must feed and water the stock and do a lot of other work at the barn and house. Both summer and winter he is pretty likely to do these chores before daylight and after dark.

It is a rather strange thing that with tremendous improvement along every other line of agricultural activity the provision of good modern lighting systems should have been so long in coming. Until the last three or four years the great majority of farm houses still got along with the old kerosene lantern for barn and yard work and with the lamp for the house.

What a difference there is now in the farm home on the Minidoka project. Instead of the coal oil lamp lighting just the center of the living room, carried from room to room when light is needed, and cleaned and filled every day, are found handsome electric fixtures. On the living room table is a reading lamp with a shade that softens the bright rays of the electric bulbs, but allows them to reach the farthest corners of the room. Bracket lights on the walls give plenty of extra light whenever it is needed.

In the barn the old lantern is known no more. Electric lamps are strung wherever they will do the most good and the switches are conveniently located.

The farm here today is enjoying just as complete electric service as the city home, because electricity on the farm affords power as well as light. Even the yard is electrically lighted. On top of a pole in the center of the area is a powerful lamp, and when this is turned on the whole premises are flooded with light.

Our good roads, rural mail delivery, telephones, and the use of electricity and the automobile will solve the problems of keeping the young people on the farms in this country, especially as community centers are developed to supply desired entertainment. One of the greatest values in a farm is its possibilities as a home, and one of the reasons why lands on the Minidoka project are bringing the highest prices is because they are not only unexcelled producers, but because of the advantages offered for real home-building.—*Burley Bulletin*.

been operated efficiently and economically. He is succeeded by Mr. A. H. Gullickson, former examiner of accounts in the western district.



## PRELIMINARY REPORT ON BEET SUGAR, 1919.

The beet-sugar production of the United States for the current season (1919-20) is estimated by the Bureau of Crop Estimates, Department of Agriculture, after a thorough canvass of the factories, at 763,848 short tons, which is below the forecasts made earlier in the season. The acreage abandoned in 1919 was much larger than usual, amounting to 193,900 acres, or 22 per cent of the planted area. Moreover, various adverse conditions injured the quality of the beets so that their sugar content is reported as the poorest in 19 years. However, the total amount of sugar indicated by this estimate is about 2,798 tons more than the crop of last year (1918-19).

### *Sugar beets and beet sugar—acreage and production in 1917-1919.*

[Figures for 1919 are based upon returns made before the end of the season and are subject to revision.]

State and year. <sup>1</sup>	Sugar made.	Average extraction. <sup>2</sup>	Average sugar content. <sup>2</sup>	Beets worked in factories.		Average farm price of beets per ton.
				Area harvested.	Quantity worked.	
California:	<i>Short tons.<sup>3</sup></i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Acres.</i>	<i>Short tons.<sup>3</sup></i>	<i>Dollars.</i>
1919.....	127,907	15.61	16.85	110,931	819,638	13.36
1918.....	122,795	14.52	17.03	100,684	845,728	9.95
1917.....	209,325	15.84	18.48	161,909	1,321,716	7.60
Colorado:						
1919.....	198,881	11.11	13.86	184,770	1,790,099	10.09
1918.....	191,880	14.07	16.10	125,882	1,363,277	10.02
1917.....	234,303	13.39	15.40	161,476	1,749,875	7.28
Idaho:						
1919.....	25,867	12.84	15.60	27,094	201,407	10.00
1918.....	44,682	13.66	16.57	32,306	326,979	10.00
1917.....	38,376	13.40	16.74	37,745	286,446	7.06
Michigan:						
1919.....	132,268	11.93	14.57	121,498	1,108,908	11.28
1918.....	127,979	14.38	16.61	114,976	890,238	10.08
1917.....	64,247	13.91	16.28	82,151	461,721	8.04
Nebraska:						
1919.....	65,550	11.30	13.72	59,756	580,284	9.96
1918.....	63,494	14.01	16.05	42,746	453,266	9.96
1917.....	53,893	12.16	14.91	51,337	443,355	7.22
Ohio:						
1919.....	30,165	10.76	14.39	30,295	280,450	11.07
1918.....	35,476	12.19	15.74	32,547	291,064	10.03
1917.....	24,467	12.08	16.24	24,234	202,624	7.18
Utah:						
1919.....	119,829	11.19	14.49	101,780	1,070,733	10.00
1918.....	105,794	11.69	15.29	81,717	905,064	10.01
1917.....	83,662	12.01	15.61	80,289	696,522	7.04
Wisconsin:						
1919.....	13,849	9.65	12.92	13,500	143,500	11.17
1918.....	13,358	14.29	16.29	12,400	93,467	10.00
1917.....	8,032	11.34	15.03	9,800	70,830	8.81
Other States:						
1919.....	49,532	12.33	14.41	46,879	401,841	10.01
1918.....	55,492	13.59	15.95	50,752	408,423	9.86
1917.....	48,902	12.46	15.52	55,856	392,456	7.28
United States:						
1919.....	763,848	11.94	14.58	696,503	6,396,860	10.75
1918.....	760,950	13.64	16.18	594,010	5,577,506	10.00
1917.....	765,207	13.60	16.28	664,797	5,625,545	7.39
1916.....	820,657	13.86	16.30	665,308	5,919,673	6.12
1915.....	874,220	14.21	16.49	611,301	6,150,293	5.67
1914.....	722,054	13.65	16.38	483,400	5,288,500	5.45

<sup>1</sup> Acreage and production of beets are credited to the respective States in which the beets were made into sugar.

<sup>2</sup> Based upon the weight of the beets.

<sup>3</sup> A short ton is 2,000 pounds.

<sup>4</sup> Including beets and sugar from 850 acres in Ontario, Canada.

## AN AUTOMATIC IRRIGATION SYSTEM.<sup>1</sup>

Near the line of the Orient Railroad, in Pecos County, Tex., there gush forth from out of the depths of the earth, at a temperature of 72°, the waters of Comanche Springs, which are used as a source of water supply for the Fort Stockton irrigation system. This system was laid out and engineered by Vernon L. Sullivan in 1913 and 1914.

The waters are now diverted from the bed of Comanche Creek, at a point about 1,000 feet below the springs, by a reinforced concrete hollow dam and are then conveyed to the lands on either side of the creek through concrete-lined canals. The water for the lands on one side of the creek is conveyed under the creek bed through a 54-inch iron siphon. All turnouts to the canals are through iron gates, and the water measurements are made over weirs of the same metal.

The siphon, all turnout gates, and weirs were made according to special plans and specifications furnished by Mr. Sullivan.

The turnout gates can be regulated to a hundredth part of a second-foot and are lockable at any point. The water supply or flow of the springs is very constant, and the regulation of the delivery of water can be made to a nicety. In the systematic delivery of water a prearranged card of dates on which each farmer is to receive his water during the season is made out at the beginning of the year and furnished to the landowners. This card gives the day and hour and the length of the run of every head of water each individual farmer will have during the coming year.

Alfalfa is the principal crop raised on the project, and experience in that locality has demonstrated that it should be cut every 33 days, and therefore the delivery dates of water are arranged to come just that often. This is accomplished by dividing the entire irrigation system into districts of equal irrigated area, and of a size so that one head of water will rotate around the district in 33 days' time.

These prearranged irrigation dates are figured so that a head of water will start in the upper part of each district, and when the time period for irrigation expires for the first farmer, the irrigation period for the next farmer will begin, and so on until the head of water has automatically rotated all around the district and is ready to start on the next rotation, according to the prearranged dates given on the card.

This manner of delivering water and irrigating on a systematic rotation basis has not only simplified the running of the system, but has also solved the labor problem to a great extent, as all labor of cutting and baling of hay automatically runs in rotation, and no two men in the same district are irrigating, cutting.

<sup>1</sup> Reprinted in part from an article by Vernon L. Sullivan, consulting engineer, El Paso, Tex., in *The Highway Magazine*.

or harvesting at the same time, and thus all the farmers plan their work accordingly. Power balers, harvesting machinery, hauling teamsters are kept busy the entire time.

Having a uniform supply of water, conveyed through concrete-lined canals where there is practically no loss of water, distributed to the various districts through some fifty-odd turn-out gates having a positive and lockable action and a distribution of water measured over excellent weirs, the control of the system at all times is almost perfect, and heads of water run for weeks at a time without variation of a hundredth part of a second-foot.

After the water is started in the spring, and the regulation is completed, one man handles the entire project. He not only handles the office work, but the entire delivery of water in all of the districts, which covers an irrigated area of some 6,000 acres, and also attends to what little maintenance there is.

### THROWING IT TO THE BIRDS.

If a well-dressed city stranger strolled into your barnyard and said, "Say, you've got money to throw to the birds, haven't you?" he would probably depart hurriedly just in front of the tines of a pitchfork. When he realizes what his crop costs in time, in labor, and in money, and balances that with the prices he has to pay, any settler would deny that he had money to throw to the birds. Yet that is just what many of them are doing.

They would not permit the birds of the air or the beasts of the field to rob their crops. Fences and the old 12-gauge shotgun take care of that danger. Nor would they open their granaries and spread a tenth of their crops around the barnyard to satisfy the hunger of the poor sparrows and the voracious crows. But they do not hesitate, many of them, to throw a tenth or more of their crop savings to the birds.

That is what they are doing every time they dispose of a Liberty bond at present market prices. They take securities which cost them full value in money, labor, and self-sacrifice, and which they *know* are sure in time to pay them dollar for dollar with interest, and scatter 10 per cent or more of their value to the winds. They are sacrificing the "world's best security." Present prices are no indication of the real value of Liberty bonds, and their future looking value is apparent to every thinking man.

The Government has paid, and will pay, every cent due in interest and principal of these obligations. Behind them is the honor and faith of the United States and the whole wealth of the Nation.

The settlers on our projects not only should keep tight hold of and guard the Liberty bonds they possess, but should take advantage of the opportunity for safe profit which lies in additional purchases of these se-

### JAMES V. RYAN, 1890-1920.

James V. Ryan, formerly settlement agent of the Service, 1917-18, in Chicago, and later in Kansas City, died January 18, 1920, at the residence of his sister, Miss Hannah V. Ryan, of Chicago.

"Jimmy" Ryan, as he was familiarly known, was born February 14, 1890, and was appointed in the Reclamation Service on July 6, 1909. In 1911 was transferred to the Yuma project, and was assigned to



JAMES V. RYAN.

the Yakima project in May, 1916, but his health failed and he was detailed to the Denver office. He served here until February, 1917, when he resigned to accept a position with a large mining corporation in Chile. His health again failing, he returned to the States and was reinstated July, 1917, to take charge of the settlement work in Chicago, and later in Kansas City. He resigned in August, 1918, to enter private work.

Mr. Ryan leaves two young children and a devoted sister to mourn his untimely demise.

The dairy improvement association is a valuable aid to the breeder and endeavors to improve the herds by hiring a man to spend his entire time visiting the farms of an organized group of farmers in order to weigh their milk, test it for butterfat, and calculate the records of production and cost.



## MONTHLY PROGRESS REPORTS FOR FEBRUARY.

Monthly conditions of principal Reclamation Service reservoirs for February, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation. Spill-way crest. <sup>1</sup>	Storage in acre-feet.				Out-flow in acre-feet.	Elevation of water surface.		
				Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.....	Roosevelt <sup>3</sup> .....	1,305,000	2128	1903	1,201,942	1,419,784	1,496,842		2117.88	2131.08	2135.54
California, Orland.....	East Park.....	51,000	1199.68	1111.68	5,000	5,810	5,810		1155.74	1157.65	1157.65
Idaho:											
Boise.....	Arrowrock.....	280,000	3211	3018	52,900	31,540	53,450	76,100	3099	3075.5	3099.5
	Deer Flat.....	177,000	2518	2488	49,705	98,867	98,867		2501.6	2508.8	2508.8
Minidoka.....	Lake Walcott.....	53,500	4245	4240	42,450	41,440	42,450		4243.9	4243.81	4243.9
	Jackson Lake.....	846,000	6769	6730	106,580	128,760	128,760		6736.01	6737.2	6737.2
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	21,300	18,850	21,300		2210.1	2209.1	2210.1
St. Mary Storage.....	Sherburne.....	33,000	4765	4720							
Sun River.....	Willow Creek.....	16,700	4130	4085	2,120	2,768	2,768		4105.4	4107.7	4107.7
Nebraska-Wyoming, North Platte.....	Pathfinder.....	1,070,000	5852	5670							
	Lake Alice.....	11,400	4182	4159							
	Lake Minatare.....	67,000	4125	4074							
Nevada, Newlands.....	Lake Tahoe.....	120,000 <sup>4</sup>	6230	6224					6225.07	6225	6225.07
	Lahontan.....	290,000	4162	4060	169,880	188,800	188,800		4149.2	4152	4152
New Mexico:											
Carlisle.....	McMillan.....	45,000	3267.7	3241.6	45,000	45,000	45,000	19,000	3267.7	3267.7	3267.7
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4231.5	1,068,622	1,120,318	1,120,318	19,367	4355.5	4357.96	4357.96
Oregon, Umatilla.....	Cold Springs.....	50,000	621.5	590	16,200	24,050	24,050		592.9	601.13	601.13
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	307,700	305,400	307,700	240	4533.9	4533.8	4533.9
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	113,150	123,950	123,950		2962	2964	2964
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	168,000	172,000	172,000		7546.8	7547.2	7558
Washington:											
Okanogan.....	Conconnully.....	13,000	2287	2232	1,394	1,604	1,604		2251	2253	2253
Yakima.....	Bumping Lake.....	34,000	3426	3389	27,100	26,865	29,955	3,090	3420.7	3420.5	3423
	Lake Clealum.....	22,800	2134	2122	27,170	25,150	27,170	2,020	2135.3	2134.5	2135.3
	Lake Kachess.....	210,000	2258	2192	149,055	159,340	159,340		2240.8	2243.4	2243.4
	Lake Keechelus.....	152,000	2515	2425	75,590	85,310	85,310		2479	2484.4	2484.4
Wyoming, Shoshone.....	Shoshone.....	456,000	5360	5132.3	303,329	286,008	303,329	33,478	5333.7	4330.2	5333.7

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> U. S. storage begins at elevation 6229.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—

Practically no water was run in any of the canals during February, owing to the fact that the demand for irrigation water was very light. There was a great deal of rainfall during the month and unusually heavy floods which caused the water to flow over the spillways at Roosevelt Dam, reaching a maximum of 7.6 feet on February 23. The maximum overflow at Granite Reef Dam was 8.05 feet. One thousand four hundred feet of the Consolidated Canal were washed out below the South Consolidated power plant.

The replacement of the apron of Granite Reef Dam was completed on February 7. This called for a total yardage of 7,666 cubic yards, 2,666 of which were placed during February.

During the month, part of the maintenance department was engaged in the work of river protection near Granite Reef Dam and along the Consolidated Canal.

There were six maintenance camps in the field during the month and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 338; average head of stock, 91; miles main canals cleaned, 12; miles laterals cleaned, 154½; number of new structures installed, 12; number of old structures repaired, 88; riprap placed, 1,600 feet; concrete placed, 2 cubic yards; dry masonry placed, 1 cubic yard; concrete pipe laid, 76 feet; dirt fill placed, 9,428 cubic yards.

The Marion shovel removed 7,200 cubic yards of dirt from the Eastern Canal during the month. Work was delayed five days for repairs and three days moving from the Eastern Canal to Consolidated Canal.

The Ruth excavator removed berm from the north bank of the Western Canal from the pumping plant downstream a distance of 6.3 miles, moving approximately 5,540 cubic yards.

*Operation of power system.*—The total power generated during the month was 4,534,410 kilowatt-hours. The maximum load carried during the month was 12,595 kilowatt-hours.

The Roosevelt power plant operated 88 per cent of the month; the Cross Cut power plant 89 per cent; the South Consolidated power plant 93 per cent; the Arizona Falls power plant 48 per cent; and the Chandler power plant 63 per cent.

All pumping plants were available for use as needed, except Battery No. 3, where the pump was being overhauled.

*Construction work, Roosevelt.*—The toe wall for the floor of the south spillway was completed. Flood conditions stopped all work below the dam on February 21. After the river receded sufficiently the construction force was employed in making the river road passable.

Work was started on a concrete flume under the roadway at the storehouse, where the old wooden flume has become dangerous.

*Office.*—The following acreages were entitled to irrigation water service on the first of the month:

	Acreage.	Number of applications.
Permanent.....	141,977.75	3,401
Normal flow.....	1,159.50	249
Temporary.....	10,734.25	248
Townsite.....	3,973.75	6
	157,845.25	3,904

W. R. Elliott.

#### YUMA PROJECT, ARIZONA-CALIFORNIA.

February weather conditions were good.

**Construction.**—On the Yuma Valley main drain the Bucyrus drag line excavator moved 12,500 cubic yards of material, station 881 to station 912.

**Operation and maintenance.**—Approximately 500 acre-feet of water were delivered to about 1,000 acres. In the Yuma Valley, Monighan drag line No. 2 moved 3,600 cubic yards of silt from the West Main Canal, station 848 to station 866. A Ruth dredge was put in operation the middle of the month and cleaned 1½ miles of lateral canals in the Yuma Indian Reservation. The work done was satisfactory and the acquisition of the machine will assist materially in the maintenance of the canal system.

On February 9 the project main canal in the Yuma Indian Reservation was damaged by floods coming down the Picacho and Seco washes. Teams were immediately placed on the work of repairs and no damage will result from the water being shut off for a short time.

On February 24 and 25, a flood occurred in the

Colorado and Gila Rivers. The gauge heights and discharge at Yuma were second only to the January, 1916, flood. The gauge on February 25 was 32.0 with discharge of 165,000 second-feet. Some apprehension was felt at Yuma on account of the flood as both rivers were up. Luckily, the rise in the Colorado River subsided to some extent before the peak of the Gila flood reached Yuma. No damage was done to the levee system, although timely work at the 16-mile point, Yuma Valley levee, prevented a break through gopher holes.

Bids for the sale of Mesa lands were opened on each Tuesday during the month and 25 tracts, containing 330 acres, were sold.

The maximum discharge of the Colorado River during the month was 165,000 second-feet, minimum 9,000 second-feet, mean 38,000 second-feet. The gauge on February 29 was 21.85 with discharge of 59,600 second-feet. The acre-feet discharge for the month was 2,188,316.

C. C. Fisher, engineer, arrived from Denver on the 3d to take field charge of the Arizona cooperative work. R. W. Burchard, of the United States Geological Survey, visited the office on the 4th in connection with the Arizona cooperative work at San Carlos, Ariz. E. W. Burr, district counsel in charge of irrigation district organization, came to the project on the same date on official business. On the 10th, J. M. Gaylord, electrical engineer, Denver office, arrived for an inspection of the drainage and pumping plants. R. J. Coffey, district counsel, was a visitor the latter part of the month.—W. W. Schlecht.

#### ORLAND PROJECT, CALIFORNIA.

February temperatures were normal. There was no rainfall until the 27th, after which date the precipi-

#### Crop report, Salt River project, Arizona, year 1918-19.

Crop.	Area (acres).	Unit of yield.	Yield.			Value.		
			Average per acre.	Total.	Per unit of yield.	Per acre.	Total.	
Alfalfa hay.....	65,651	Ton.....	4	262,604	\$13.50	\$54.00	\$3,545,154	
Barley.....	11,516	Cwt.....	19	218,804	2.65	50.35	579,830	
Beans.....	180	Lb.....	950	171,475	.08½	80.75	14,575	
Berries.....	155					450.00	69,750	
Cotton.....	66,148	Lb.....	1,000	66,148,000	.21	210.00	13,891,080	
Fruit, citrus.....	1,840	do.....	7,000	12,880,000	.05½	385.00	708,400	
Fruit, deciduous.....	1,884	do.....	10,000	18,840,000	.03½	350.00	659,400	
Garden.....	923					250.00	230,750	
Lettuce.....	150	Crate.....	275	41,250	1.05	288.75	43,312	
Grain, sorghum.....	19,770	Cwt.....	20	395,400	2.25	45.00	889,650	
Indian corn.....	4,083	Lb.....	1,800	7,349,400	.03	54.00	220,482	
Watermelons.....	831	Cwt.....	160	132,960	.90	144.00	119,664	
Cantaloupes.....	4,429	Crate.....	190	841,510	1.15	218.50	967,717	
Oats.....	1,870	Cwt.....	20½	38,445	3.05	62.52½	116,922	
Pasture.....	18,863					30.00	565,890	
Potatoes.....	467	Lb.....	2,300	1,074,300	.02½	57.50	26,852	
Sudan grass.....	1,276	Ton.....	6	7,656	12.50	75.00	95,700	
Vineyard.....	241	Lb.....	7,000	1,687,000	.11	770.00	185,570	
Wheat.....	13,301	Cwt.....	18	239,418	3.50	63.00	837,963	
Total and average.....						126.27	23,768,232	
Total acreage cropped (not including townsite areas).....	213,578							
Less acreage cropped twice.....	25,346							
Net acreage cropped.....	188,232							
Plus vacant land, including roadways, ditches, etc.....	8,460							
Plus home tracts, including house lots, corrals, etc.....	5,226							
Total acreage reported, less duplicated areas.....	201,918							
Plus townsite acreage on which no crop was reported.....	3,146							
Total acreage receiving water service from project.....	205,064							

1 Actual cash market returns.



tation was 0.9 inch. The normal for the month is 2.5 inches. The rainfall for this season to March 1 is 4.11 inches, and the normal is 11.7 inches. The shortage of rainfall prevails throughout all of the State north of the Tehachapi and if not relieved by unusually heavy precipitation during the next 30 days will result in a disastrous loss to the agricultural interests of the State. Some of the dairymen of the project, unable to obtain feed, are disposing of their cows, about 10 carloads of which were shipped out during the month. The accumulation of storage at East Park during the month was 810 acre-feet and the total stored supply at its close 5,810 acre-feet. All of the flow of Stony Creek at the diversions was used for irrigation. For the month this amounted to about 900 acre-feet when delivered to the land and was used to irrigate about 1,600 acres, most of which was alfalfa. A small force of scraper teams completed the ditch cleaning for the season. A force of 12 head of stock and 36 men was employed in construction work. Twelve thousand eight hundred square yards of lining were placed and three small structures built. The annual meeting of the water users for the election of the directors of the association was held on the 28th. Instructive talks were given on irrigation practice, pest control, and other subjects of interest to the farmers.—A. N. Burch.

#### GRAND VALLEY PROJECT, COLORADO.

February weather conditions were unfavorable for outside work. The thawing of the snow already on the ground, together with several additional rain and snow storms, made the roads through the valley practically impassable. A surplus of labor was available for the limited operations of the project.

The only farm work undertaken was the feeding of live stock. Practically all the hay and forage crops on the project have been sold to owners of cattle and sheep. Alfalfa hay is bringing \$22.50 per ton in the stack.

The regular maintenance employees were engaged on the repair of canal and lateral structures, overhauling of pumping plant machinery, repairing concrete in Tunnel No. 3, and the construction of wooden structures at the maintenance camps. Weather conditions prevented the undertaking of any earth work or cleaning of canals and laterals.

On account of the condition of the roads, it was not considered economical to operate any of the drag lines on the drainage construction. All the machines were overhauled and put in good shape for the season's work and operations will be resumed early in March. Two drainage culverts under the Grand Valley canal were completed during the month.

The office force was employed on studies and investigations of seeped areas on the project and report and recommendation covering proposed new work was submitted to the Denver office. The preparation of the annual project history was nearly completed.—S. O. Harper.

#### UNCOMPAHGRE PROJECT, COLORADO.

February weather was favorable, but on account of the amount of moisture in the soil and the bad condition of the roads it was not possible to do much work either on the farms or on the irrigation system.

The prices of all farm products remained about the same, except for alfalfa hay, which decreased several dollars per ton.

A small amount of water was carried in the canals for domestic and stock use.

Practically all of the brushing was finished, a concrete floor was placed below the Selig Canal weir, the

bulkhead was finished at the foot of the incline to the Gunnison Tunnel, and numerous wooden structures were repaired or replaced. Repair work was started on the concrete lining of the South Canal near mile post 2.

Practically no construction work was in progress. Location surveys were made on the Stutheit and Miller laterals.

Work has been commenced on the sugar factory at Delta and prospects are good for the construction of a factory at Montrose.—Fred D. Pyle.

#### BOISE PROJECT, IDAHO.

Mild, clear days with frosty nights prevailed during February. The precipitation was very light, being 0.35 inch, as compared with the mean for the past 57 years of 1.46 inches.

*Labor conditions.*—The resumption of construction work, building, and lumbering operations that were suspended with the beginning of winter, as well as the beginning of the season's farming operations, created a demand for men and teams that soon exhausted the available supply. During the latter part of the month full crews could not be maintained.

*Farming operations.*—During the latter part of the month in general the ground was in good condition for plowing. On the majority of the farms this work was begun. Considerable land leveling was under way and some raw land was cleared. The baling and shipping of hay continued, but due to mild open weather the demand decreased.

Winter feeding is still in progress with the stock in a thrifty condition.

*Water supply.*—The precipitation both in the valley and on the mountains was far below normal. The total discharge for Boise River during the month was 65,702 acre-feet, as compared with the mean for the past 25 years of 75,260 acre-feet.

*Operation and maintenance.*—The Main Canal was operated throughout the month delivering water into Deer Flat Reservoir. Canal cleaning and repairs to structures were in progress. This work was hampered to some extent by labor shortage.

*Construction.*—Work was continued on the suspended contract of William Long for the construction of some 3,400 linear feet of the Notus Canal. This schedule is nearly completed.

Two drag line excavators continued on the drainage work in the Riverside irrigation district. Machine No. 3 working on the South Alkali drain encountered considerable quicksand which retarded the progress of the work. Machine No. 4 made good progress on the Riverside drain. Two shifts were used on each machine.

Four additional relief wells were put down in the waterlogged area at the upper end of the Wilson drain within the Nampa and Meridian irrigation district. Water under pressure was encountered in each well at a depth of about 46 feet.

*Surveys.*—Surveys made during the month consisted of giving lines and grades for the construction work in progress and miscellaneous surveys for structures and land classification.—J. B. Bond.

#### KING HILL PROJECT, IDAHO.

February weather was generally warm for this season of the year and favorable for construction work except for the fact that the nights got quite cold and it was necessary to protect all concrete placed during the month until it was well set up. The local labor supply was not plentiful. However, plenty of





men were obtained by shipment from Boise, Salt Lake, and Butte.

At camp 4 repairs to the Head-end flume were completed as well as the combination flume and lining at station 230. A force of men was also employed on the construction of an automatic head gate structure at the head end where the King Hill canal takes its water from the flume operated by the Idaho Power Co. Camp 4 was shut down the latter part of the month and left in charge of a caretaker.

At camp 5 all of the concrete work was completed on Deer Gulch siphon and about two-thirds of the wood staves were in place at the end of the month. However, these staves have not been completely banded. About one-third of the semiprecast slabs have been placed on the flume bench and the floor poured. About 600 feet of gunite side walls on the combination concrete and gunite flume were placed during the month and work was also begun on the flume section on trestle at station 811.

One engineering field party was employed at each camp giving lines and grades on construction work and supervising the erection of Deer Gulch siphon.

The office engineering and clerical forces were employed during the month on routine work and on the preparation of the annual project history which was nearly completed at the end of the month.

Very little operation and maintenance work was in progress.

George Pierce, cement expert, from the bureau of standards at Denver, visited the project on the 26th.—*Walter Ward.*

#### MINIDOKA PROJECT, IDAHO.

On the South Side pumping unit a repair crew, consisting of a foreman and five men, began work about the middle of February repairing and replacing minor structures. To improve the service to a small area a contract has been made for the construction of a lateral known as the H-14 High Line. The contractor began work as soon as frost was out of the ground, and had practically completed the lateral at the end of the month.

Repairs to the South Side pumping stations which have been under way during the winter were practically completed at the end of the month, and the pumping stations are ready for operation.

Accruals for 1919 operation and maintenance on the South Side pumping unit, due March 1, 1920, amounted to \$96,478.32. Of this amount \$68,004.85 was paid on or before March 1, or 70½ per cent of the total.

Surveys and office engineering included investigations and studies of conditions resulting from operation of the project, and also studies preliminary to new construction.

Discharge at Howells Ferry amounted to 278,931 acre-feet as compared with 286,488 acre-feet for January. At Jackson Lake the gates remained closed throughout the month, and the water surface rose from 6,736.01 on January 31 to 6,736.87 on February 21, corresponding to a storage of 15,990 acre-feet, or 122,570 acre-feet to date. On the corresponding date last year the storage amounted to 300,780 acre-feet. Lake Walcott was regulated only for power purposes.—*Barry Dibble.*

#### HUNTLEY PROJECT, MONTANA.

February weather conditions were unsettled. The coldest weather prevailed during the latter part of the month. A total of 6.15 inches of snow fell during the month.

Repair work was continued throughout the month on equipment, small tools, cars, trucks, concrete mixers, and both the hydraulic pumping plant and the auxiliary plant. This latter work could not be completed as repairs did not arrive on schedule. An attempt was made to open gravel pits on the Ballantine townsite but weather conditions would not permit. Inventories of storehouse and equipment have been practically completed.

Operation and maintenance bills for water used in 1919 were due March 1 and during February \$10,782.49 was collected.

R. H. Fifield, project manager, completed his work on March 1 and was furloughed for three years. W. M. Green arrived on February 28 and assumed the duties of project manager March 1.—*W. M. Green.*

#### MILK RIVER PROJECT, MONTANA.

February weather conditions were mild and comparatively favorable for construction work but unfavorable, due to snow and ice conditions, for range stock.

Construction work was confined to framing and erection of an additional barrel on two flumes of the Dodson North Canal near Dodson, and the building of a few wooden turnouts to be placed in the spring.

Maintenance work consisted of repairs to the sluice gate at Dodson Dam and a few minor jobs. The Wagner and Paisley camps were in charge of caretakers.—*Geo. E. Stratton.*

#### ST. MARY STORAGE UNIT.

February weather conditions were not particularly severe, although they were such that stock being wintered had to be fed practically the entire month. There was more precipitation than during January, and at the end of the month there was considerable snow in the St. Mary drainage basin.

The assistant engineer in charge of the St. Mary storage work was in the Browning office the entire month.

The field force consisted of four men who were employed feeding stock, looking after three camps, getting out about 500 fence posts, and clearing drift from Sherburne Lakes reservoir. No construction work was attempted.—*R. M. Snell.*

#### SUN RIVER PROJECT, MONTANA.

February weather was generally mild with occasional severe winds. There was about 4 inches of snow on the ground at the end of the month.

No construction work was performed.

Farmers were engaged principally in thrashing alfalfa seed, hauling hay, caring for stock, and repairing and constructing farm buildings. On the Fort Shaw Division five farm residences and three barns are being constructed. One farmer on this division did some plowing during the month. Carload shipments of farm produce on the Great Northern were very light, but a considerable tonnage of hay was hauled from the Fort Shaw unit by dry-land farmers. Large shipments of alfalfa and eastern hay were unloaded at Fairfield for the farmers on Greenfields Bench. There were shipped from Fort Shaw and Simms one carload of hay and one of straw.

Maintenance work consisted of river protection work at the Fort Shaw canal headworks, hauling rock for riprap on lateral K-5, telephone repairs, and hauling hay and powder from Gilman to Willow Creek reservoir.—*Geo. O. Sanford.*

## LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

During the first half of February the weather was springlike and the greater part of the snow melted. The last half of the month the weather was somewhat colder than the normal, although the temperature for the entire month was 5° above the normal. Prospects for an early spring were not promising at the end of the month. The precipitation amounted to only 2 inches of snow, or 40 per cent of the normal.

The Monighan drag line excavator No. 2 was operated continuously until the 25th when it was necessary to close down one shift due to sickness of one of the operators. This machine moved down the canal 1,600 feet and excavated about 6,500 yards of gravelly material. Considerable difficulty was experienced with frozen material caused by the thawing of the snow during the first part of the month. On district No. 2 a small force was engaged in placing locking devices on all main canal turnouts, constructing wooden turnouts, and repairing equipment in readiness for work as soon as weather permits.

The forage situation is becoming somewhat serious and, should the winter extend well into April, the loss of stock other than on the project will be serious. Considerable poor grade of slough hay from the east is being shipped in and sold locally at about \$30 per ton. Stock on the project has not suffered any thus far although the alfalfa supply is becoming dangerously low.—*L. H. Mitchell.*

## NEWLANDS PROJECT, NEVADA.

Moderate weather prevailed during February.

On February 1 Examiner of Accounts A. H. Gullickson completed an inspection of the project.

On February 2 a meeting of the board of directors of the irrigation district was held, attended by the

project manager and the district council, for discussion of drainage contract and consideration of project matters.

On February 3 to 5 the project manager and the district counsel conferred with Judge L. N. French on irrigation district matters in Reno, Nev., meeting Consulting Engineer D. C. Henny there also for consideration of Lake Tahoe and Truckee River storage matters.

On February 23 an important meeting was held by the board of directors of the irrigation district, attended by many members of the district, by Attorney for the District R. W. Stoddard and project officials. A resolution was passed providing for an election to be held on April 6 for voting on the question of project drainage. Provision for repayment of the project operation and maintenance deficit was also discussed.

On February 24 to 26 District Counsel E. W. Burr visited the project in connection with the suit of John E. Bennett against the United States relative to the Lake Tahoe rights of way.

*Construction work and survey.*—Reconstruction and extension of the "S" lateral system for delivery of water under vested water-right contract to lands of John W. Freeman Co. continued with dragline No. 2 in operation. Contract work on Schedule IV of the Langford lateral was practically completed by A. Weishaupt. On February 9, under readvertisement, bids were opened for excavation of Schedules I, II, and III of Langford lateral. J. A. Wood was awarded contract for these schedules, involving 8,300 cubic yards of class 1 material at 23 cents per cubic yard.

On February 13 bids were opened for the construction of the Downs lateral and a portion of the Freeman lateral. Four schedules involving 9,961 cubic yards in the Freeman lateral, and three schedules involving 9,110 cubic yards in the Downs lateral was covered by the proposals received. W. D. Spencer was

*Crop report, Milk River Project (exclusive of Chinook Division), Montana, year of 1919.*

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay <sup>1</sup> .....	4,203	Ton.....	8,907	2.1	\$24.00	\$213,768	\$50.86
Alfalfa seed.....	111	Bushel.....	325	2.9	20.00	6,500	58.56
Barley.....	80	do.....	1,432	17.9	.96	1,375	17.19
Beans.....	2	do.....	10	5.0	6.60	66	33.00
Corn, flint.....	29	do.....	615	21.1	1.25	769	26.52
Corn, fodder.....	48	Ton.....	246	5.1	15.00	3,690	76.87
Flax.....	231	Bushel.....	1,141	4.9	4.09	4,667	20.20
Garden.....	52	do.....	.....	.....	.....	7,415	142.60
Hay <sup>2</sup> .....	14,518	Ton.....	9,372	.6	29.00	271,788	18.72
Oats.....	507	Bushel.....	12,491	24.6	.62	7,744	15.27
Pasture.....	614	do.....	.....	.....	.....	7,728	12.00
Potatoes.....	49	Bushel.....	6,505	132.7	2.16	11,051	226.76
Rye.....	24	do.....	182	7.6	1.01	183	7.62
Wheat.....	3,762	do.....	29,105	7.7	2.10	61,120	16.25
Less duplicated areas.....	161	do.....	.....	.....	.....	.....	.....
Cropped.....	24,099	Total and average.....	.....	.....	.....	600,861	24.93
Young alfalfa.....	456	.....	.....	.....	.....	.....	.....
Fall plowed.....	930	.....	.....	.....	.....	.....	.....
Total other purposes.....	1,386	.....	.....	.....	.....	.....	.....
Total irrigated.....	25,485	.....	.....	.....	.....	.....	.....
			Areas.		Acres.	Farms.	Per cent of project.
			Total irrigable area farms reported.....		41,402	249	23.0
			Under rental contracts.....		41,402	249	23.0
			Total cropped area farms reported irrigated.....		24,099	247	13.4

<sup>1</sup> About 38 per cent of this acreage is new alfalfa from which only a light cutting was obtained.

<sup>2</sup> Native blue joint hay 96 per cent, grain hay 4 per cent.

<sup>3</sup> 159 farms more than 50 per cent irrigated, 88 farms less than 50 per cent irrigated.



awarded Schedules I to IV, Freeman lateral, at 20 cents per cubic yard.

Excavation of Downs lateral was awarded as follows: Schedule V to J. C. Shepard and C. O. Shepard at 21 cents; Schedule VI to C. H. Hancock at 30 cents; and Schedule VII to T. V. Conner at 25 cents. Work under these contracts was in progress at the end of the month.

On February 19 dragline excavator No. 4 commenced excavation of J1 Drain cut-off in Carson Lake tract.

Surveys were made as required in connection with the above construction work.

*Settlement.*—Public Notice No. 35, dated January 26, 1920, was received for the opening, under date of February 26, 1920, of 1,575 acres of public and private lands under Lahontan Reservoir.

Two applicants requested that 400 acres of new lands be placed upon the plats.

*Water supply and use.*—On February 29 the depth of snow at Summit, Calif., was 47 inches, which small amount gives little promise for Lake Tahoe Storage. Storage in Lahontan Reservoir increased to 188,800 acre-feet on the last of the month.

*Operation and maintenance.*—Dragline excavator No. 3 reinforced the banks of the "U" lateral at the Moriarity fill over a length of about 1,320 feet.

Seven and one-half miles of laterals were cleaned, using teams and Fresnoes. About 900 square yards of brush riprap were placed along the "V" line canal.

One mile of the upper end of the "LB" lateral was enlarged, using teams and Fresnoes.

Willows and brush were cleared from 10½ miles of laterals, this work being done largely by the ditch-riders in their respective districts.

Three new minor structures were installed in the lateral system, and 24 structures were repaired.—*D. S. Stuver.*

#### CARLSBAD PROJECT, NEW MEXICO.

February weather for the most part was warm and cloudy during the daytime, followed by cold nights. During the latter part of the month there was some rain.

*Construction.*—Request was made to this office by the Pecos Water Users' Association early in January to concrete line a portion of the Black River Canal. There being no money in the Reclamation Fund with which to do this work under supplemental construction, a contract was entered into with the association whereby they furnished \$10,000 with which to defray the expense of lining the canal. An order was placed for 600 barrels of cement through the Denver office. The cement was received on the project about February 9 and stored close to the work. On February 20 a small force started trimming the section preparatory to placing concrete. About 1,000 feet of ditch were prepared for concrete at the end of February, and everything was in readiness to commence placing concrete on March 1.

No water was used for irrigation during the month. Maintenance work consisted of repairs to the metal flume at the head of the Black River Canal. This work was completed about the 20th of the month. One combination gate and drop and one combination weir and drop were built in Lateral 26. These structures were built of concrete, and were constructed for the purpose of supplying water to second unit land. Three crews were employed in cleaning the lateral system.

#### Crop report Carlsbad project, New Mexico, year of 1919.

Crops	Area (acres).	Unit of yield.	Yields.		Per unit of yield.	Values.	
			Total.	Average per acre.		Total.	Per acre.
Alfalfa hay	7,031	Ton	21,306	3.03	\$20.18	\$429,974	\$61.15
Alfalfa seed	912	Pound	123,041	135	.245	30,199	33.11
Barley	66	Bushels	1,396	21.15	1.73	2,420	36.66
Cane	379	Ton	721	1.90	14.61	10,538	27.80
Corn fodder	429	do	556	1.30	15.73	8,746	20.38
Corn, Indian	511	Bushel	11,797	21.80	1.57	17,773	32.85
Corn, sorghum	279	Cwt.	2,725	9.75	2.76	7,528	27.00
Cotton	8,713	Pound	12,525,805	290	.50	1,262,902	144.96
Cotton seed	8,713	Tons	2,399	.275	70.00	167,930	19.27
Garden	34	do	1,995	16.76	.56	2,750	80.87
Oats	119	Bushel	1,995	16.76	.56	1,111	9.33
Pasture	1,080	Acre	1,995	16.76	.56	23,535	21.79
Peaches	53	Pound	134,753	2,542	.044	5,998	113.17
Pears	7	do	13,500	1,929	.043	585	83.57
Potatoes, sweet	21	do	181,620	8,649	.033	6,056	288.38
Wheat	301	Bushel	5,727	19.02	1.83	10,501	34.88
Total acres	28,678						
Less duplicated areas	9,925						
Total cropped	18,753		Total and average			1,988,546	106.04
			Areas.		Acres.	Farms.	Per cent of proj- ect.
Fall alfalfa seeding	388		Total irrigable area farms reported		24,990.6	2565	100
Fall oats, seeding	157		Total irrigated area farms reported		20,363	565	81
Irrigated without crops	1,065		Under water-right applications		24,990.6	565	100
Less duplicated areas	1,610						
Total other purposes	1,610						
Total irrigated	20,363		Total cropped area farms reported		18,753	565	75

<sup>1</sup> 5,051 five hundred pound bales of cotton.

<sup>2</sup> Water-right applications.

This work was about 70 per cent completed at the end of the month. The wire mattress work at Lake McMillan was completed as far as it was possible to do so considering the elevation of the water in McMillan. The force employed on that work, under the regular foreman, was employed for a few days building small concrete farm turnouts in Lateral 9, when it was moved to Black River to assist in the concrete construction work in progress at that point.

The run-off of the river at the Dayton station averaged 650 acre-feet during the month. The total run-off amounted to 19,000 acre-feet. Water was wasted through the reservoir headgates at periods during the entire month, as both reservoirs were full.

Labor was scarce as during the previous months, and work on the farms was seriously delayed. Work on the farms consisted largely of plowing and the preparation for the coming season's crop. Considerable alfalfa land was plowed up during the winter in preparation for cotton planting. Late cotton was being picked and ginned during the early part of the month. The gins closed down about the 25th. Prices of cotton, which was largely low grade, ranged from 25 to 40 cents per pound. The Loving cotton gin was purchased by the Otis Gin and Warehouse Co. and part of the stock was taken by the farmers of the Loving district. New machinery will be installed at this point before the next ginning season. Alfalfa hay was selling for \$35 per ton, f. o. b. the project. The little hay left on the project is being purchased for local consumption. No shipments were made during the month.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

February weather was warmer than the average for that month, and the precipitation slightly greater than the average. As a consequence the winter crops are all in excellent condition and the early garden crops have a good start. A large acreage was plowed during the month. Irrigation water was released on February 15, and delivered for about 10 days during the month. A few breaks, due to the activity of gophers, since the last recent irrigation of water, occurred. Minor maintenance and repair work on canals and drains proceeded during the month; 1,600 cubic yards of earth were placed in canal banks and 2,600 cubic yards of silt were removed from drains in the Mesilla Valley in addition to the removal of weeds from the drains throughout the project.

The newly elected directors of the El Paso County Water Improvement District No. 1 decided to obtain the services of a manager for the irrigation district since the retirement of J. A. Smith, who so long had active charge of the affairs of the district. Roland Harwell, county farm bureau manager, was appointed to the position of manager for the irrigation district, and this appointment should produce excellent results for the affairs of the district and increase the cordial relationship between the district and the Reclamation Service.

During the month C. E. Piatt, examiner of accounts, arrived on the project and continued here in his work of inspecting accounting and fiscal matters.

Negotiations proceeded with the La Union Irrigation District looking toward the transfer of the ditch property to the Reclamation Service for operation and maintenance.

Both irrigation districts of the project held directors' meetings during the month, which were attended by the project manager. Particular matters under discussion concerned proposed opening of certain units and operation and maintenance of the project.

The principal construction work during February was the continuation of the drainage program. Considerable construction work was also done on canals and laterals previous to water being turned in. The lateral work consisted mainly of installing new or additional structures in old canals. Some new lateral work was in progress in the El Paso Valley. The construction of the Salatrall lateral by drag line was begun at its outlet near Fabens. Drainage construction progressed in the Mesilla Valley with 5 Government machines and 1 contract machine, excavating 202,787 cubic yards. In the Rincon Valley the 1-T drag line excavated 25,015 cubic yards on the Garfield drain. Two drag lines in the El Paso Valley excavated 47,313 cubic yards.

At Elephant Butte Dam the new liners and auxiliary control have now been installed on two of the four balanced valves.—*L. M. Lawson.*

#### NORTH DAKOTA PUMPING PROJECT.

February weather was about normal and such as to have no particular effect upon the work in hand. A short period of thawing weather about the middle of the month covered the range with a thin sheet of ice which made grazing difficult and was hard on live stock.

Maintenance work was limited to repairs about the power plant and coal mine.

The power plant was operated for the commercial power contract; 97,700 kilowatt-hours of electrical energy were delivered to the city of Williston. This was 9,950 kilowatt-hours more than was furnished in the same month last year.

Nine hundred tons of coal were mined.—*Wm. S. Arthur.*

#### UMATILLA PROJECT, OREGON.

February weather conditions were marked by a low wind movement and a deficient precipitation; 0.17 inch precipitation was recorded during the month as against an average for this month for 11 years of 1 inch. Only 2,246 miles of wind movement were recorded as against an average for the previous 10 years of 4,371 miles. The mean temperature of 37.3° was 0.4 of a degree higher than the average for the previous 13 years. The lack of precipitation is very serious in so far as it affects the water-supply conditions in the Blue Mountains.

*Farming operations.*—As the frost came out of the ground land leveling was begun by the farmers. Owing to the severe weather throughout the winter development work has been delayed and operations are now being carried on with energy. Little other farm work was done. Shipment of farm products were light, only six cars of alfalfa, hay, and meal being shipped. One car of honey was shipped and several small shipments of alfalfa, meal, apples, and honey were reported.

*Labor conditions.*—Labor conditions were not serious and no trouble was had in getting full crews for the work on Canal A and for maintenance work.

*Operation and maintenance.*—Operation of the feed canal for storage was resumed on January 31 after an interruption of 1½ months. The first water reached the reservoir about 1 p. m., February 1. The head was steadily increased until the morning of the 13th when a break occurred near the 5-mile post on the south side of the Stanfield loop. The break was caused by muskrats. Repairs were made and water turned in at about 1 p. m. on the 14th. The new bank did not hold and water was cut out again the same



night. Repairs were made and water returned to the canal at 7 a. m. on the 17th. The head was steadily increased until the 21st, when 268 second-feet were being diverted. The river had been steadily falling and with the canal diverting all the water in the river the head had fallen to 248 second-feet at the close of the month, of which 204 second-feet were reaching the reservoir. Thirty-five second-feet were delivered continuously throughout the month to the Echo flouring mill. At the close of the month a total storage of 24,050 acre-feet had been attained. In view of the discouraging water-supply conditions in the Blue Mountains this storage is somewhat disquieting. Heavy rains in the foothills and snow in the mountains during the early spring months may change the situation materially, but at this time with the river falling and the early beginning of operations by prior rights on the river there is a strong possibility of a serious shortage of water for the coming season. Conditions are even more unpromising for the private projects in the Umatilla Valley.

Sluicing operations on the west extension main canal were carried on throughout the month. Fair progress has been made, but owing to the heavy deposits of sand along the east side of Juniper Canyon the work in this vicinity has gone slowly. One maintenance crew of 2 to 5 men and one 2-horse team were employed on the east side throughout the month on general maintenance work. A crew of three to six 4-horse Fresno teams and 6 to 10 men were employed from the 13th to the 17th on repairs to the break on the feed canal.

*Enlargements and betterments to Canal A.*—On February 12, 1920, contract was executed with the Newport Construction Co. for the excavation of approximately 8,000 cubic yards of class 1 material on Canal A. At the close of the month the contractors had removed 3,000 cubic yards of class 1 material. A small force of several men and one team were employed since the 13th on excavation work preparatory to the extension of the flume section at the

head of the canal; 5 cubic yards of class 1 material and 55 cubic yards of class 2 material were excavated; 100 linear feet of structure drainage was done.

*General.*—The matter of chief interest on the project during the month was the election held by the West Extension Irrigation District on the contract with the Government. A total of 110 votes were cast, only 9 of which were recorded as against the contract.

*Visitors.*—On February 18 Fred H. Henshaw, of the United States Geological Survey, Portland, Oreg., called at this office.—*Maurice D. Scroggs.*

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

February was extremely favorable for outdoor work. There were almost no cold or stormy days, practically every day being a good working day. Considerable plowing was done. It was possible to do some canal cleaning and excavation, although northerly slopes and moist ground were frozen too deeply to permit work. The total precipitation for the month was 0.1 inch. This is only about 10 per cent of the average precipitation and is the lowest for February, with one exception, for more than 10 years. The total precipitation for January and February together is only about 10 per cent of the normal, based on a 10-year record.

Labor conditions were about the same. Men were not plentiful; wages varied from \$4.50 to \$5 per day. Two crews, consisting of a foreman and 6 men in each crew, were employed the greater part of the month repairing the timber flume in Canal "C." The work consisted in replacing bents and stringers which had become rotten, also patching and placing a false bottom in the waterway. Two other crews, consisting of a foreman and 3 men each, were employed in replacing structures, building small flumes, bridges, and general structure work. Another crew, consisting of a foreman and three 4-horse fresno out-

#### Crop report, Klamath project, Oregon-California, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	13,467	Ton.....	35,674	2.65	\$15.52	\$553,720	\$41.09
Barley.....	2,044	Bushel....	41,682	20.4	1.13	47,100	23.00
Garden.....	96	Acre.....				13,118	136.65
Hay (rye, etc.).....	2,159	Ton.....	2,902	1.34	11.37	32,995	15.28
Oats.....	2,679	Bushel....	71,462	27.0	.81	57,884	21.60
Pasture.....	8,567	Acre.....				38,286	4.47
Potatoes.....	224	Bushel....	25,885	115.5	.93	24,173	107.90
Rye.....	508	...do.....	5,355	10.0	1.32	7,068	13.90
Wheat.....	2,903	...do.....	42,217	14.5	1.92	81,056	27.90
Miscellaneous.....	41	Acre.....				4,405	107.44
Total cropped.....	32,688	Total and average.....				859,805	26.30
			Areas.		Acres.	Farms.	Per cent of proj- ect.
Not cropped.....	5,193	Total irrigable area farms reported.....			40,809	444	90
			Total irrigated area farms reported:				
			Under water-right applications.....		37,881		77
			Under rental contracts.....		13,028		7
			Cropped area farms reported.....		32,688		72
Total irrigated.....	37,881						

• Not irrigated.

fits, have been employed in cleaning the Adams Canal.

The influenza epidemic greatly retarded work during the last half of the month, as the disease was very prevalent over the project.

The middle of the month advertisements were issued for leasing about 8,000 acres of Tule Lake lands, bids to be opened March 5.

A. H. Gullickson, examiner of accounts, was on the project from February 4 to 14.—*Herbert D. Newell.*

*Prevailing crop prices at close of February, 1920.*

Project.	Alfalfa hay, per ton.	Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Pota- toes, per bushel.
In stack.	Baled at ship- ping point.				
Salt River.....	\$16-\$22	\$24-\$30	\$1.63		\$2.16
Yuma.....	25.00	30.00			
Orland.....		35.00	1.85	2.20	
Grand Valley.....	22.50	27.50	1.40	\$1.00	1.93
Uncompahgre Valley.....	12.00		1.50	.90	2.00
Boise.....	21.00	28.00	1.44	1.15	1.85
King Hill.....	22.50	27.50		1.16	3.00
Minidoka.....	16.00	20.00	1.56	1.04	2.40
Huntley.....		25-30		3.00	
Milk River.....	25.00	30.00	1.06	.78	2.36
Sun River.....	31.00	36.00	1.40	.95	2.32
Lower Yellowstone.....	30.00		1.15	1.00	2.65
North Platte.....					
Newlands.....	20.00	26.00			
Carlsbad.....		35.00			
Rio Grande.....					
North Dakota pumping.....					
Umatilla.....		29.00			
Klamath.....	20.00	30.00	1.40	.93	1.95
Belle Fourche.....	20.00	26.00	1.65	.95	2.60
Strawberry Valley.....	33.00			1.18	2.55
Okanogan.....	25.00				
Yakima.....					
Sunnyside unit.....	17-21	23-25		2.25	2.75
Tieton unit.....	17-21	23-25		2.25	2.75
Shoshone.....	19.00	23.00		1.30	2.50
Indian projects:					
Blackfoot.....	32.00		1.06	.79	2.28
Flathead.....		35.00		1.10	2.70
Fort Peck.....	30.00	35.00		.81	2.50
Rierton.....	20.00				1.86

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

February weather conditions were not favorable for outside work, and although not severe it was too cold to accomplish satisfactory results.

Work was in progress, when the weather would permit, on lowering and correcting the grades of the Indian Creek and Horse Creek flumes, also in replacing decayed timbers. This work should be completed during March.

Sand was hauled and preliminary work done in getting ready to build concrete pipe for the town-site lateral siphon at Newell. The work was being delayed somewhat at the end of the month due to the failure of reinforcing materials to arrive.

No farm work in preparation for spring seeding was accomplished due to more than a foot of frost in the ground. Roads were rough and at times very slippery.

Live stock on the project was in good condition and it is believed the supply of forage will hold out until grass comes. Lambing was begun in many herds and the percentages reported are satisfactory.

Work on the combined project history and annual operation and maintenance report was continued and the report mailed February 21, 1920.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

February weather was generally cold and clear during the first part of the month, with considerable snow and rain during the latter part. At the Strawberry Reservoir the precipitation was 1.98 inches and at Provo 1.54 inches.

The power plant was operated without interruption of any kind and power furnished to the towns of Payson, Salem, Spanish Fork, and Springville. The new thrust bearings for the water wheels were received and preparation for their installation has been begun.

A carload of reinforcing steel was hauled from the power plant and loaded on cars at Mapleton for transfer to the Grand Valley project.

The preliminary report on the extension of the project canal system into East Juab County was handed to the landowners' committee on February 13, the details of the report being explained at a conference held on that date.

Conferences were held with members of boards of directors from the Springville and Mapleton Irrigation Districts and representatives from the other units on the project. A number of new water-right applications have been received on the Spanish Fork and High Line units, those on the High Line unit being mostly for an increase in their water right from 2 acre-feet to 2½ acre feet per acre.

A request was received from the present owners of the Elberta project for the privilege of purchasing all the water remaining unsold under the Strawberry Valley project.

The Utah State Farm Bureau is taking an active interest in the price to be paid for sugar beets during the coming farming season and paragraph 7 of their proposed form of contract which mainly covers the price to be paid, reads as follows:

The Bureau, or its assigns, shall pay to the Grower on the 15th day of each month \$11 per ton for beets delivered the preceding calendar month. The Bureau, or its assigns, shall also pay to the Grower on January 15, 1921, an amount per ton for beets delivered during the year 1920, in addition to the purchase price hereinbefore mentioned, equivalent to the difference between the said purchase price per ton and 1½ times the average seasonable price per bag of sugar obtained during the calendar year of 1920, said average price to be determined by the quotations on sugar made during the entire calendar year of 1920 and to be determined and based upon the official reports of Willett & Gray.

There were 8,000 acres planted in sugar beets on the project during the season of 1919, hence the price that will be paid for sugar beets during the coming season is rather an important matter to the project as a whole.

The 1919 project history is being prepared.

Orders are being placed for supplies and machinery for the repair work at the Strawberry tunnel that will be done before the irrigation season opens.

The epidemic of influenza that broke out on the project about the middle of January has run its course and entirely disappeared. There were quite a number of deaths on account of it, but not nearly as many as during the winter of 1918-19.

Good progress was made on the report on the preliminary investigation of the Castle Peak project and an effort is being made to secure additional funds to continue this investigation work as soon as the weather will permit in the spring.—*J. L. Lytel.*



## OKANOGAN PROJECT, WASHINGTON.

For practically the entire month of February mild weather prevailed, the days being bright and fair and warm, with cold nights. Precipitation was far below normal and perhaps shows the lowest precipitation for the month of February on record.

The shipping of apples has been carried forward as fast as possible by the growers and shippers, but an extreme car shortage existed, with no relief in sight. At the close of the month a large part of the apple crop was still in storage. The prices have dropped some more, and are now about 5½ cents per pound. Alfalfa hay remained at \$25 per ton in the stack.

The regular routine office work was carried forward during the month and considerable work on the water records and tabulations has been done in connection with the annual operation and maintenance report and project history.

The project manager visited Wenatchee in connection with emergency work made necessary by the expected water shortage, and there met with the chief electrical engineer, J. M. Gaylord, and others interested in the possible construction. The project was visited by Mr. Gaylord from February 20 to 26 and by Mr. D. C. Henny, consulting engineer, from February 23 to 26, both of whom were here in connection with the probable water shortage for the year and were interested in checking up the situation as to a probable water supply and in making estimates and recommendations for emergency measures to take care of the project orchards during the coming irrigation season.—*Calvin Casteel.*

## SALMON LAKE DAM.

February weather was exceptionally mild and presented little variation during the month. The days were uniformly bright and moderately warm; the nights were clear and cold. As the cold nights prevented the frost from leaving the ground, little construction work was possible.

No work was in progress on the Salmon Lake Dam. At Conconully Dam 2,640 cubic yards of gravel were placed on the downstream apron, completing that job. Work was in progress all month on the road around Salmon Lake; the work was confined mainly to clearing right of way and drilling and shooting solid rock. A steam shovel was operated on this road work less than a week, excavating 485 lineal feet of roadway. During the first three weeks of the month from one-fifth to one-third of the crew was off duty on account of the influenza epidemic and other sickness.—*L. V. Branch.*

## YAKIMA PROJECT, WASHINGTON.

Prevailing temperature for February was about normal, but precipitation was greatly below normal, 0.22 of an inch being received as snowfall on the Tieton unit and 0.07 of an inch on the Sunnyside unit. No snow remained on the ground at either location at the end of the month. Snow conditions at the various reservoirs at the end of the month were as follows:

	Inches.
Keechelus .....	14
Kachess.....	12
Bumping .....	5
Cle Elum .....	T.

*Operation and maintenance.*—Maintenance of the Sunnyside unit consisted of removal of weeds and willows from canal rights of way, painting of flumes and metallic structures, and reconstruction and renewal of delivery structures in the distribution system. Nothing in the way of earth work on the canals or removal of silt could be undertaken on account of frost yet remaining in the ground. Good progress was made on overhauling of pumping plants, several of the units being reassembled during the month ready for operation.

On the Tieton unit betterment work on the sub-lateral system was continued, consisting for the most part of replacement of wood flume and nonreinforced concrete pipe with wood stave pipe. Other maintenance work in progress consisted of grubbing willows on main and sublaterals, minor repairs to delivery structures, adjustment of headgate and spillway machinery, a small amount of riprap work at head of Lateral "C" and along North Fork Creek channel above Dam No. 2, and telephone-line repairs.

*Investigation and surveys, Kennewick unit.*—Preparation of designs for power and main canal structures was practically completed by the engineers in charge of these surveys. Preliminary plans for the Chandler pumping plant were prepared in the office of the electrical engineer at Denver.—*R. K. Tiffany.*

## SHOSHONE PROJECT, WYOMING.

Moderate temperatures prevailed during February. There was practically no precipitation. The roads continued in fair condition and most of the crop has been marketed; the alfalfa mill completed grinding for the season.

*Water supply.*—The surface of Shoshone Reservoir dropped 3.5 feet during the month. The outflow measured 17,321. Very little thawing of mountain snowdrifts occurred.

*Operation and maintenance.*—The principal maintenance work on the Garland Division consisted of loading rock at Corbett, shipping it to O'Donnel siding, and hauling it along the banks of the main canal for use in riprapping below drops; 200 cubic yards of rock were thus handled and 45 hayrack loads of sagebrush were used on the same work. On the Frannie Division 62 cubic yards of rock were placed as riprap in various reaches of Deaver Canal, and the radial gate in the Polecat Dam was moved from the wasteway to the Deaver Canal opening. Miscellaneous work consisted of reading drain weirs and making N. I. L. surveys leading to the revision of the irrigable area of several farm units.

*Crops.*—No work was in progress except marketing. The following carload shipments of produce from the project were made: Meal, 12; hay, 101; straw, 12; potatoes, 1; wheat, 1; oats, 1.

*Labor.*—There was no demand for labor by the Service. High wages prevailed. Carpenters' wages advanced to \$8 per day.

*Drainage.*—The Bucyrus dragline was unloaded at Deaver, set up and put to work on the Howell drain; 2,512 cubic yards were moved. Considerable difficulty was experienced in keeping a full crew of dragline runners. Some work was done on repairing the Austin trencher.

*Field and office engineering.*—There was no field work done out of the Powell office during the month. Office work consisted of completion of the 1919 project history; work on a set of project maps, and the preparation data and plats for the eighth unit opening; casting in record form and summing up the results of

the irrigable area surveys of the Willwood Division in anticipation of instructions as to the governing features in the design of the canal and lateral system thereof.

On the Frannie division field work consisted of flagging out the farm unit corners of the lands in the eighth unit; making topographic surveys for a wasteway from Frannie canal at Mantua and of the lower reach of Sage Creek, where Polecat Creek silt is causing damage; making revision in the location and cross-sectioning the Howell drain. The office work consisted of completion of the general project map, preparation of notes and plats for R. O. W. surveys, for some of the lateral systems through State school lands, and mapping, etc., in connection with the field work.

**Settlement.**—One farm unit was relinquished during the month. Under date of January 28, 1920, public notice No. 21, announcing the opening of the eighth unit of the project, was issued. On February 5 Congress passed a joint resolution giving honorably discharged soldiers, sailors, and marines 60 days' preference right in filing. From February 15 to 28, inclusive, 1,445 letters of inquiries were answered, the greater portion of them being from discharged soldiers. From the inquiries received it is believed that a large number will be at the drawing, which takes place on March 13.

**Operation and maintenance collections.**—A little over half of the unit holders have paid their 1919 operation and maintenance, taking advantage of the 5 per cent discount.

**Water users' association.**—The new board of directors has circulated a ballot among the water users on the questions of formation of irrigation district, building of a new headquarters office, and opening for sale in Powell township of a tract now reserved for fair grounds. The ballots will be opened March 2.

**Construction.**—No construction work of any consequence by contract was carried on during the month. Government forces placed one 20-foot span highway bridge, and placed 254 square yards of riprap on Deaver Reservoir dike.—*Ferd. Bonstedt.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

February weather conditions were generally about normal, and there were no particularly severe storms or high winds.

No construction work was attempted. No field force was employed except one foreman for one week, who was preparing to cut timber for minor structures during March. The office force was employed principally on routine work.

The only farm work done was stock feeding.—*R. M. Snell.*

##### FLATHEAD PROJECT, MONTANA.

February weather conditions were favorable for the small amount of construction work being done. The precipitation, 0.04 inch, is the lowest recorded for the month during the period in which records have been kept. Rather cold nights have damaged the winter wheat to some extent on account of the lack of snow cover.

At McDonald Lake a small crew was employed getting out wood to be used by the steam shovel here and on the Feeder Canal. Extremely hard digging was encountered by the steam shovel in making the excavation for the spillway. All of the excavation was Class 2 or Class 3 and a large part of it was wet.

On the Polson A lateral the excavation was continued throughout the month. The main wooden drop

was constructed and material assembled on the ground for the metal flumes.

Irrigable area surveys were continued in the Post and Horte divisions.

Engineer C. J. Moody was engaged on the survey of the Tally Lake irrigation district under the contract between the district and the reclamation service.

Sufficient labor was available for the project requirements.

No operation and maintenance work was carried on except in Jocko Division where some repairs were made on the wooden flumes.—*W. C. Christopher.*

#### Project weather during February, 1920.

Project.	Station.	Temperature, °F.			Precipitation (inches)
		Maxi-mum.	Mini-mum.	Mean.	
Salt River.....	Phoenix, Ariz.....	76	39	57.6	1.46
Yuma.....	Yuma, Ariz.....	78	40	60.5	.66
Orland.....	Orland, Calif.....	77	27	49.8	.90
Grand Valley.....	Grand Junction, Colo.....	56	13	33.9	.83
Uncompahgre Valley.....	Montrose, Colo.....	56	16	33.3	.26
Boise.....	Boise, Idaho.....	59	20	35.4	.35
King Hill.....	Glenns Ferry, Idaho.....	60	16	38.5	.12
Minidoka.....	Burley, Idaho.....	58	12	34	.28
Huntley.....	Ballantine.....	53	— 9	23.5	.21
Milk River.....	Malta, Mont.....	42	— 7	19.4	.05
St. Mary storage.....	Near Babb, Mont.....	51	—19	24	1.37
Sun River.....	Fort Shaw, Mont.....	53	— 9	30	.3
Lower Yellowstone.....	Savage, Mont.....	41	—20	19.4	.22
North Platte.....	Wyncote, Wyo.....				
Newlands.....	Fallon, Nev.....	62	12	36.1	.52
Carlsbad.....	Carlsbad, N. Mex.....	80	25	50.1	.72
Rio Grande.....	El Paso, Tex.....	75	31	53.4	.83
North Dakota pump-ing.....	Williston, N. Dak.....	40	—22	16	.13
Umatilla.....	Hermiston, Oreg.....	62	17	37.3	.18
Klamath.....	Klamath Falls, Oreg.....	62	13	36	.10
Belle Fourche.....	Orman, S. Dak.....	56	— 6	26.8	.18
Strawberry Valley.....	Provo, Utah.....	59	11	36.5	1.54
Okanogan.....	Omak, Wash.....	52	15	34.2	.15
Yakima.....					
Sunnyside unit.....	Sunnyside, Wash.....	60	18	37.3	.07
Tieton unit.....	Cowiche, Wash.....	59	20	34.8	.22
Shoshone.....	Powell, Wyo.....	50	0	25.9	T.
Indian projects:					
Blackfeet.....	Browning, Mont.....	42	— 9	21	.26
Flathead.....	St. Ignatius, Mont.....	56	8	31.2	.04
Fort Peck.....	Poplar, Mont.....	40	—27	15.5	.22
Riverton.....	Pavillion, Wyo.....	58	—13	23.6	.35

##### FORT PECK PROJECT, MONTANA.

The temperature during February was about 6 degrees above normal and generally fair.

The snow has been about 8 inches deep and the sledding good. It has been necessary to feed range stock during the entire month. All the local hay has been fed and hay is being shipped in for the balance of the winter.

No construction work was in progress.

The office force was employed on the preparation of the project history, tracing the topography of the irrigable area under Big Muddy Creek, and the preparation of estimates for the completion of the project.—*R. M. Conner.*

##### RIVERTON PROJECT, WYOMING.

The temperature during February was about normal. There was a small amount of precipitation. Owing to constant melting and freezing the roads were very rough.

Dragline No. 1 was operated with one shift from February 1 to 7. Dragline No. 2 was operated with

(Continued on page 198.)



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

### Monthly Progress Reports.

(Continued from page 197.)

one shift from February 1 to 8 and 21 to 29, and with two shifts February 9 to 20. These machines are working on a steep side hill at about mile  $4\frac{1}{2}$  of the Wyoming Canal. The total amount of excavation during the month was 12,738 cubic yards of class 1, most of it heavy, coarse gravel. The second shift will be placed on Dragline No. 2 early in March. The building of the construction camp has been continued.

A considerable quantity of construction materials and supplies have been received at Riverton. Topographic surveys have been continued by two field parties. Progress has been slow, owing to the long distance of the work from camp.—*H. D. Comstock.*

#### GENERAL OFFICES.

*Washington office.*—With the exception of a few days during February when Mr. Davis was in New York in connection with the work of the International Joint Commission on the division of the waters of St. Mary River between the United States and Canada, and on other business, the office was in charge of the director. During his absence Mr. Bien was acting director.

Mr. Davis attended a hearing before the Committee on Irrigation of Arid Lands of the House of Representatives in connection with Imperial Valley matters.

Judge King was in the office during the month.

Mr. Gullickson arrived on February 20 to act as chief accountant during the absence of Mr. Cavis, who left for the West on February 15.

Among the visitors to the office during the month were the following: A. C. Cooley, of the Department of Agriculture, in charge of demonstrations on Reclamation projects; Messrs. Perrine and Hollister, Idaho;

## FEBRUARY WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

In the greater part of the western States February was mild and brought less precipitation, and especially less snowfall, than normal. The first 10 days were notably warm for the season, but afterwards the temperature fluctuated considerably, especially in the Rocky Mountain States and to eastward, and the last few days were cold in Wyoming and southern Montana, and to the southeastward as far as central Texas. The month averaged cooler than normal in parts of Wyoming, Oregon, and California, but elsewhere in the West warmer than normal, with an excess of 5° per day, or more, in most of the Dakotas and eastern Montana, in nearly all the Plateau region, and in a portion of New Mexico.

During the first 10 days of February there was precipitation in several portions of the West, particularly in part of southern California, and in Arizona, New Mexico, and southern Utah about the 8th–10th. The middle portion of the month was mainly without precipitation of importance. From about the 20th to the end of the month there was rain or snow in most of California, Nevada, Arizona, and Utah, also in most of Wyoming and adjoining portions of other States. The total precipitation of February was greater than normal in far southern California and a few other parts of the State, in practically all of Arizona and New Mexico, also southern Utah, and was far above normal in central Wyoming. There was a considerable deficiency in the western portions of Texas, Oklahoma, and Kansas, and a very marked deficiency occurred in the northwesternmost part of the country, over an area embracing the northern half of the California coast, and thence northward and northeastward to the Canadian boundary, the northern half of Nevada, about all of Idaho, and as far as the continental divide in Montana. In proportion to the average February fall, the shortage was greatest in Washington and Oregon, where most counties received less than a tenth of the normal quantity.

Mr. Rossborough, of the Oregon-California Power Co.; Messrs. McPherrin, Kibby, and Davis, of Imperial Valley, Calif.; Senator Leroy Wright, San Diego, Calif.; D. W. Ross, Dr. Owens, and Gov. Spry, in connection with the Fletcher bill for nation-wide reclamation; and former Gov. Sloane, of Arizona.

*Denver office.*—The chief of construction and Assistant Chief of Construction R. F. Walter were in the office until February 29, when they left for a visit to the southern projects. Assistant Chief of Construction Charles P. Williams left on February 11 for a board meeting on the North Platte project, returning on the 27th. Official visitors included Messrs. D. C. Henny, F. D. Pyle, Walter Ward, F. L. Cavis, William M. Green, and F. A. Banks.—*Chas. P. Williams.*

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

Hon. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSANG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.  
 ARTHUR POWELL DAVIS, Director and Chief Engineer of the Reclamation Service.  
 WILL R. KING, Chief Counsel of the Reclamation Service.  
 CLAY TALLMAN, Commissioner of the General Land Office.  
 CATO SELLS, Commissioner of Indian Affairs.  
 GAYLORD M. SALTZGABER, Commissioner of Pensions.  
 JAMES T. NEWTON, Commissioner of Patents.  
 PHILANDER P. CLAXTON, Commissioner of Education.  
 GEORGE OTIS SMITH, Director of the Geological Survey.  
 VAN H. MANNING, Director of the Bureau of Mines.  
 STEPHEN T. MATHER, Director of the National Park Service.  
 Col. F. MEARS, Chairman Alaskan Engineering Commission.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Office of the director and chief engineer: Morris Bien, assistant to the director; J. B. Beadle, secretary to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor Reclamation Record; E. C. Bebb and C. A. Bissell, engineers; J. H. Pellen, chief draftsman; A. H. Gullickson, chief accountant; C. E. Piatt, southern district, Denver, Colo.; F. G. Hough, northern district, Helena, Mont., examiners of accounts; C. A. Lyman, chief of repayment accounts section; C. E. Harris, auditor of transportation accounts; Mrs. J. T. Davis, chief of auditing section; Miss H. A. Fellows, fiscal agent; C. H. Fitch, chief clerk; C. N. McCulloch, chief of mails and files section; Emmet Carr, purchasing agent; T. E. Brown, chief of stenographic section; G. W. Numbers, appointment clerk.

Office of the assistant to the director: D. H. Sibbett, J. E. Golladay, and A. G. Pollock, counsel; Mrs. G. B. Mathiot and Alfred Dresser, assistant counsel; Mrs. E. W. Ballard, C. E. Womersley, and D. S. Kcoantz, clerks.

Office of the chief counsel: Ottamar Hamel, assistant to the chief counsel; Geo. A. Ward and E. W. R. Ewing, counsel; Frank J. Bergin, assistant attorney.

## DENVER OFFICE.

F. E. Weymouth, chief of construction, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chiefs of construction; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; S. E. Hedden, disbursing officer.

## FIELD OFFICES OF CHIEF COUNSEL.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Denver, Colo.**—Law section office of chief of construction: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel. Office of irrigation district organization: E. W. Burr, district counsel; also in charge North Platte and Belle Fourche Project.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Black Feet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr and R. J. Coffey, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Pond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauff, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Balfant, Mont.; G. H. Bolt, chief clerk and fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; E. V. Hillius, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. A. Keever, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Rothl, irrigation manager; J. R. Ummel, chief clerk; O. K. Barnes, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk and fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, project manager, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; C. E. Brodie, fiscal agent.

**Strawberry Valley Project.**—J. L. Lytel, project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; L. H. Kline, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—F. D. Pyle, project manager, Montrose, Colo.; A. H. Peach, chief clerk; C. B. Funk, fiscal agent.

**Yakima Project.**—R. K. Tiffany, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppeimann, chief clerk; E. M. Philebaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk and fiscal agent.

**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; R. V. Sass, superintendent of construction; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk and fiscal agent.

WORK AND SAVE. BUY GOVERNMENT SECURITIES





1



4



2

1. IMP. BRED HORSE, STATIONER, NEW YORK  
2. HERD OF HOLSTEINS, NEW YORK  
3. SHIRAZ, IMP. BRED HORSE, STATIONER, NEW YORK  
4. SHIRAZ, IMP. BRED HORSE, STATIONER, NEW YORK  
5. REGISTERED HOLSTEIN, STATIONER, NEW YORK  
6. REGISTERED HOLSTEIN, STATIONER, NEW YORK  
7. DARTMOUTH, IMP. BRED HORSE, STATIONER, NEW YORK  
8. HOLSTEIN, IMP. BRED HORSE, STATIONER, NEW YORK  
9. A HERD OF HOLSTEINS, STATIONER, NEW YORK  
10. SHIRAZ, IMP. BRED HORSE, STATIONER, NEW YORK  
11. PURE BRED HORSE, STATIONER, NEW YORK  
12. HERD OF HOLSTEINS, STATIONER, NEW YORK



5



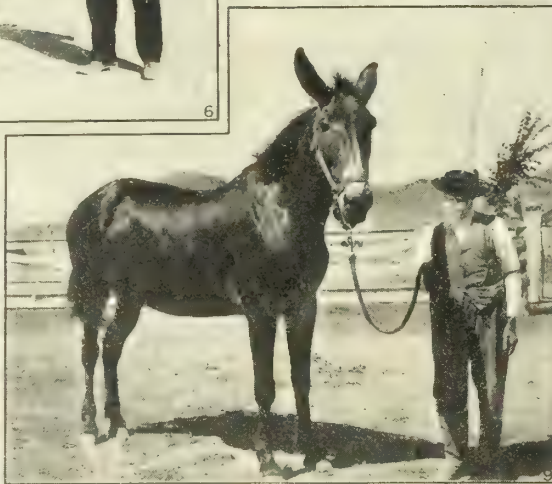
6



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8



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LIVE STOCK  
ON  
GOVERNMENT  
PROJECTS



11



12

# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURER INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

VOLUME 11, No. 5

PRICE {NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

MAY, 1920



OUR BABIES.

(For key, see pp. 208 and 209.)



### OUR BABIES.

As Mrs. Littlepage has pointed out so clearly in her article this month, "better babies" are one of the greatest assets of a nation. What is true of the Nation as a whole is equally true, on a smaller scale, of our projects. "Better babies" might well be added to the slogan "Better Business, Better Farming, Better Living," carried each month on the front page of the Reclamation Record.

In the Record for May, 1917, in the interest of the "better babies" campaign, we printed photographs of the babies of our water users; and, incidentally, this was one of the most popular numbers we have issued. In this month's Record the employees of the Washington office, the Denver office, and the project offices are represented by over a hundred "better babies." Three proud grandfathers and a grandmother are represented, and we are going to single "their" babies out for special mention. They are Florence Eslin (No. 107), granddaughter of Arthur P. Davis, Director; Betina H. Bien (No. 110), granddaughter of Morris Bien, Assistant to the Director; Martha Fitch (No. 111), granddaughter of C. H. Fitch, Chief Clerk, and Richard M. Hunt (No. 13), grandson of Mrs. C. M. MacMullen, all of the Washington office.

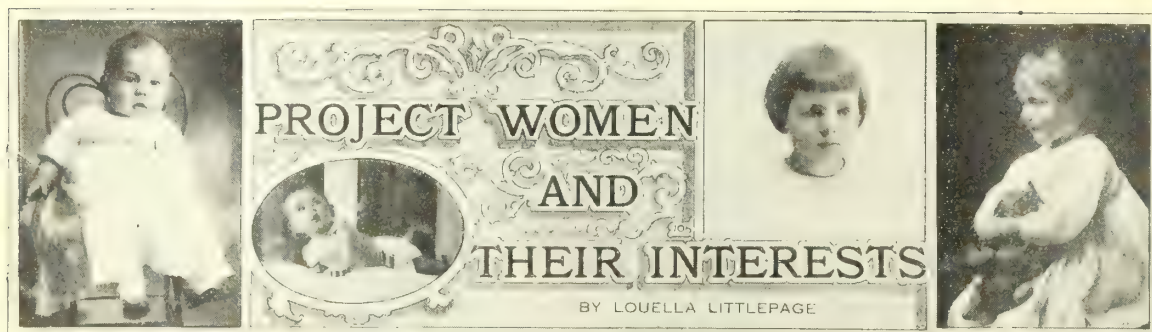
Special mention should also be made of J. C. Carter, photographer, who copied and enlarged many of the photographs in order to make them suitable for reproduction, and particularly of J. H. Pellen, chief draftsman, who arranged the photographs in the artistic manner shown.



HON. JOHN BARTON PAYNE, SECRETARY OF THE INTERIOR.

Instead of being appointed Judge of the Superior Court of Cook County, Ill., as stated in the April issue of the Reclamation Record, Judge Payne was elected in the campaign of 1893. Ten Democrats were candidates for 10 places, but Judge Payne was the only one elected.





(For key, see page 209.)

In the Catskill Mountains in southeastern New York a recent traveler was deeply impressed with the signs posts at various points warning passers-by of dangers on the State highway. There were the customary directions to "slow down," "dangerous curve ahead," "short turn on steep grade," "railroad crossing at foot of hill," etc., past all of which he and his faithful car rambled with little more than the ordinary caution. At last, however, there appeared a warning which could not be ignored. It read "IF YOU WANT TO LIVE, SLOW DOWN."

It was a similar warning that the Government put out three years ago when the Children's Bureau launched a campaign for better babies which swept the country like wildfire. Because, unlike other civilized countries, the United States had no general system of birth registration, it was impossible to give absolutely correct figures, but the Census Bureau tabulated statistics from such progressive States as had adopted this measure, and made conservative estimates.

"Three hundred thousand babies under one year of age died in this country last year," a heading read, "of whom at least one-half would now be living had we, as individuals and communities, applied those measures of sanitation and hygiene which are known and available." To the same carelessness which cost the lives of 150,000 babies every 12 months was also attributed the annual loss of 15,000 mothers.

A prominent sanitary expert says that the same conditions which cause the death of 13 out of every 100 babies born throughout the civilized world, on the broadest of averages, leave more or less permanent stamps on perhaps two or three times as many babies who somehow manage to crawl over the infant dead line, many of whom will be the fathers and mothers of the next generation. The problem of infant mortality, therefore, is far more than one as to decreasing the number of infant deaths.

Shortly after these statistics on infant mortality were published it was announced that about one-third of the drafted men examined for the Army were rejected for physical defects, many of which might have been prevented or cured in infancy and early

childhood if the parents had understood how it could be done. And the defects which disqualify a man for military service hamper him in civil life as well. From these warnings it was obvious that a nation which knew so great a proportion of its manhood was in something less than normal physical condition and that a large part of such weakness could easily have been prevented would be blind and stupid if such conditions were permitted to go unchecked.

There are more than 10,000,000 children under 5 years of age in the United States, and they are passing through physically the most hazardous years of the whole span of life. Now is the time to correct curable physical defects and to start them along the road to normal and healthy development by proper food, careful attention to their hygiene, and by keeping close watch over them to the end that they may become healthy, happy, and useful citizens.

Mothers and fathers, especially in rural districts, have not always been able to get for their children the advice of doctors and skilled nurses to guard their health and care for the ailments that seemed slight and not worth bothering about. In this way many slight physical handicaps have been allowed to develop into serious defects.

Every mother and every father naturally wants to know what the dangers are that threaten children and what can be done to combat them.

Dr. Holt, the eminent authority on children's diseases, says that the fundamental causes of infantile mortality are mainly the result of three conditions—poverty, ignorance, and neglect. We do not believe a single father or mother in this broad land willingly or knowingly comes under any of these headings. Government scientists estimate that there are three groups of diseases which together cause about three-fourths of all the deaths among babies. These three groups are:

1. Digestive diseases, which cause most of the deaths of babies in summer. Bottle-fed babies are most often affected.

2. Diseases of the lungs.

3. Diseases due to conditions affecting the child before or at birth.



OUR BABIES.

(For key, see pp. 208 and 209.)



Some of the causes of these diseases are:

1. Of the digestive diseases: Lack of breast feeding, improper feeding, impure milk, carelessness of mothers, hot weather, overcrowding, bad housing, and insanitary conditions.

2. Of the diseases of the lungs: Infections (largely from people sneezing in their presence or kissing them) and bad air.

3. Of the diseases affecting the child before or at birth: Sickness in the parents, overwork of the mother, or improper care before or at birth.

Men give the utmost attention and care to their breeding stock, but usually leave the entire matter of care of children to the mother, whose lack of training along these lines, ambition, and unselfishness work frequent disaster. The mothers of men are entitled to at least the same consideration that is given to the mothers of blooded horses, and when the warning statistics were published even busy legislators paused to aid the movement toward better conditions. The statement that 15,000 mothers are dying yearly in this country from causes connected with childbirth tells but part of the story, for uncounted mothers are suffering from unnecessary illness because they did not have the proper care, and thousands of children pay for the lack of a strong, healthy, happy mother in many ways, sometimes with constitutions permanently weakened past upbuilding. In many tiny bodies the flame of life burns so feebly at birth that it is soon snuffed out because mothers were ill, or overworked, or underfed during the momentous months preceding. It is not only the useless loss of life that must be combated but the existence of invalid women and puny children destined to a lifetime of ill health and inefficiency. It is much easier and cheaper to see that mother and baby have the right food and proper care for a brief period than to undo the results of improper care and food. The Children's Bureau, Washington, D. C., will furnish valuable literature on this subject upon request.

Rural communities, which we are apt to consider more healthful than the crowded cities, have a higher death rate all over the country, due in a great measure to the fact that each household is more of a law unto itself in the country than in the city, and the ignorance of one woman or thoughtlessness of one man may work great ill to the family. The fact is many women in the rural districts the country over have to work too hard at other things to have time to take proper care of their babies or themselves, but it is really easier in the long run to care for babies properly than otherwise.

For instance, probably the most deadly of infantile diseases are digestive disorders—gastritis, dysentery, acute inflammation of the stomach and intestinal diseases, which are the result almost wholly of errors in the diet. Clean food, properly prepared and given at regular intervals, is less trouble than a haphazard method.

The infantile organism is not so well prepared as the adult to contend with infectious material; the digestive fluids are not fully developed and are not fitted for antiseptic action on disease-producing organisms. Yet the average baby is given many foods he can not digest; he is given "tastes" from various dishes on the family table, and many mothers boast with superior smiles, "Oh, my baby eats everything we have on the table," as if that were something to be proud of. Then if he develops cholera infantum or convulsions and dies, it is blamed on teething or Providence, and he is laid away under the inscription, "The Lord giveth and the Lord taketh away."

The average baby also is allowed to suck its thumb or a germ-laden pacifier, the result usually being a deformed mouth or some germ disease which may or may not make itself immediately known. We have heard intelligent mothers boast, "My baby sucked his thumb from the time he was born and it never hurt him a particle." Men have been known to drink wood alcohol and live, but it is not advisable, just the same, to take up wood-alcohol drinking as a pastime.

Likewise, many babies have survived irregular feeding, the mother taking them up for the purpose whenever they whimpered.

And every one of these little mothers, with the divine love which comes only with maternity, has probably done her best according to her understanding.

If you have had no opportunity to have your babies examined and weighed and tested by experts in your community, start a movement for a "baby week" yourself, or appeal to some woman's club or similar organization to arrange for expert advice and consultation.

A few years ago the whole country was aroused and drastic measures adopted to prevent the spread of infantile paralysis, but infantile paralysis, horrible as it is, is but a drop in the bucket compared with the myriad of dangers which constantly threaten, and which can be eliminated. If you can not do anything else, remember that more babies die of bad milk in certain months than of infantile paralysis in years. Find out why, and see that the babies in your community have pure milk. Thousands of babies die every summer as a result of contamination of food by flies. Exterminate the fly and see that your community fights this pest with you. Thousands of babies' lungs are weakened by constant breathing of bad air. See that your babies have plenty of pure air night and day, but keep them out of drafts. One paper recently made the startling statement that 40 per cent of our babies are born under the care of a midwife instead of a physician. Criminal!

#### BIRTH REGISTRATION.

One more thing every citizen can do, and that is ascertain if his State requires birth registration; and, if it does not, then start something, at least in his own little corner. The birth-registration area at





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this time comprises 20 States and the District of Columbia. In these States 90 per cent of the births are recorded. They are:

Connecticut.	New York.
Dist. Columbia.	North Carolina.
Indiana.	Ohio.
Kansas.	Pennsylvania.
Kentucky.	Rhode Island.
Maine.	Utah.
Maryland.	Vermont.
Massachusetts.	Virginia.
Michigan.	Washington.
Minnesota.	Wisconsin.
New Hampshire.	

If your State is not on this list you should help your State board of health put it there. Complete registration is indispensable to any comprehensive work for the welfare on the babies. Without it regulations for the prevention of blindness in babies can not be enforced; the public health nurse can not be

sure of reaching every baby; and the death rate among babies—that most sensitive index of social well being—can not be reckoned either for the community as a whole or for districts within a community.

Aside from furnishing a basis for preventing infant mortality and blindness, and for discovering the causes which maim and weaken the lives of thousands of children whom they do not kill, an adequate birth record has a direct practical value throughout the entire life of the individual. It is a necessary factor in determining matters of descent, relations of guardians and wards, enforcement of laws relating to compulsory education and child labor, the administration of estates, and the settlement of insurance and pensions, the right of admittance to and practice of professions, and the right to occupy many public offices, the propriety of issuing marriage certificates, the disabilities of minors, and any number of other matters depending upon the establishment of the exact age of the individual.

### Key to Illustrations.

1. Virginia Cavis, Washington, D. C.
2. Donald L. Coffin, Boise, Idaho.
3. Sarah E. Williams, St. Ignatius, Mont.
4. Jean Herrick, Boise, Idaho.
5. Kent Bebb, Washington, D. C.
6. Bobbie Jordan, Washington, D. C.
7. Lester C. Persson, Savage, Mont.
8. Frank E. Numbers, Washington, D. C.
9. Kenneth N. and Raymond W. Pyle, Montrose, Colo.
10. William R. Judd, Denver, Colo.
11. Betty and Roger Young, Denver, Colo.
12. Maxine Trimble, Grand Junction, Colo.
13. Richard M. Hunt, Washington, D. C., grandson of Mrs. C. M. MacMullen.
14. Catherine Coe, Washington, D. C.
15. Valworth R. Plumb, Denver, Colo.
16. Robert L. and George Evans, Denver, Colo.
17. Lawrence R. Whittemore, Provo, Utah.
18. Jean E. Smith, Washington, D. C.
19. Anna Belle Hubbell, Deaver, Wyo.
20. Dorothy Moss, Washington, D. C.
21. Constance Stratton, Malta, Mont.
22. Maxine Mitchell, Savage, Mont.
23. Donald E. Golladay, Washington, D. C.
24. Robert and Thomas Harper, Grand Junction, Colo.
25. Robert G. Keever, Malta, Mont.
26. Eleanor Alexander, Montrose, Colo.
27. Janet Diehl, Burley, Idaho.
28. Russell, Catherine, and Margaret Walker, Grand Junction, Colo.
29. Enid Hall, Grand Junction, Colo.
30. Renee and Leota Overlade, Provo, Utah.
31. Mary E. Chabot, Malta, Mont.
32. Richard, Helen, and Louise Ruhnke, Washington, D. C.
33. George L. Crawford, Burley, Idaho.
34. Clelie B. Huggins, Provo, Utah.
35. Barbara E. Johnson, Klamath Falls, Oreg.
36. Munson Dowd, Sunnyside, Wash.
37. Shiela and Galen James, Sunnyside, Wash.
38. Bob Lowy, Denver, Colo.
39. William E. Coffin, Clint, Tex.
40. Barbara Stone, Sunnyside, Wash.
41. Eunice L. Parsons, Malta, Mont.
42. Margaret Whitmore, Malta, Mont.
43. Eddie Ward, Provo, Utah.
44. Thelma G. Cullen, Mitchell, Nebr.
45. Robert E. Kershner, Denver, Colo.
46. James W. Weinkauf, Boise, Idaho.
47. Dorothy Blackmer, Grand Junction, Colo.
48. Helen L. Dowd, Sunnyside, Wash.
49. Susan W. Drager, Denver, Colo.
50. Gladys Thompson, Malta, Mont.
51. James and Laing Sibbett, Washington, D. C.
52. Eleanor Carr, Washington, D. C.
53. Betty Schlapkohl, Burley, Idaho.
54. Robert Bickel, St. Ignatius, Mont.
55. Betty Nalder, Albert Kerr, Madeline Smith, James Ayers, Howard Smith, John Ayers, Bill Ayers, Poplar, Mont.
56. William R. Reeves, Mitchell, Nebr.
57. Elizabeth Coffin, Boise, Idaho.

58. Charles E. Lounsbery, jr., Denver, Colo.
59. Francis, Helen, and Polly Moore, Yakima, Wash.
60. Ralph and Dorothy M. Boden, Torrington, Wyo.
61. Rollin Ayers, Yakima, Wash.
62. Opal Ada Bierly, Yakima, Wash.
63. Carolyn L. Piatt, Denver, Colo.
64. Dorothy Conner, Poplar, Mont.
65. John Henry Campbell, Hatch, N. Mex.
66. Elizabeth Jane Graham, Denver, Colo.
67. Victor Jean Scheele, Denver, Colo.
68. Velma Ruth Plumb, Denver, Colo.
69. Walter L. and Anna Maxine Jones, Mitchell, Nebr.
70. Herbert D. Newell, jr., Klamath Falls, Oreg.
71. Marguerite and Buster Koeplin, Burley, Idaho.
72. Martha Schlappkohl, Burley, Idaho.
73. Irving Lester Lowy, Denver, Colo.
74. Stuart H. Mong, Mitchell, Nebr.
75. Albert Kerr, Poplar, Mont.
76. George Moore, Yakima, Wash.
77. John Koontz, Washington, D. C.
78. Norman Lyman, Washington, D. C.
79. Carleton B. Stetson, Mitchell, Nebr.
80. Robert H. Slaughter, jr., Washington, D. C.
81. Edgar Allen Shippee, Provo, Utah.
82. Lewis E. Foster, jr., Carlsbad, N. Mex.
83. George and James Swan, St. Ignatius, Mont.
84. Patricia C. Taylor, Yakima, Wash.
85. Augusta, Bertha, and Edward Siebeneicher, St. Ignatius, Mont.
86. Johnny McRae, King Hill, Idaho.
87. Paul and Francis Leverone, Washington, D. C.
88. Hildreth Remington, Sunnyside, Wash.
89. William Stephens, Klamath Falls, Oreg.
90. Jean Page, Grand Junction, Colo.
91. Albert Kerr, Poplar, Mont.
92. Lindsey B. Barnes, Mitchell, Nebr.
93. Oscar K. Barnes, Mitchell, Nebr.
94. Leo J. Foster, jr., Denver, Colo.
95. Helen Elizabeth and Victor Lee Minter, jr., Carlsbad, N. Mex.
96. Nellie Mae Moser, Malta, Mont.
97. Max Erickson, Mitchell, Nebr.
98. Marie Josephine Koontz, Washington, D. C.
99. John Charles Koppen, Klamath Falls, Oreg.
100. Orborne Reilly Wheeler, Yakima, Wash.
101. Margaret Jean Palmer, Sunnyside, Wash.
102. Marianne Claire Foster, Carlsbad, N. Mex.
103. Estelle Marie Tucker, Boise, Idaho.
104. Sumner Paul Youngblutt, Savage, Mont.
105. Phyllis Irene Keener, Boise, Idaho.
106. Grace Harris, Washington, D. C.
107. Florence Eslin, Washington, D. C., granddaughter of Director A. P. Davis.
108. Lavina Banks, Burley, Idaho.

109. John Banks, Burley, Idaho.
110. Betina H. Bien, Washington, D. C., granddaughter of Morris Bien.
111. Martha Fitch, Washington, D. C., granddaughter of C. H. Fitch.
112. H. H. Johnson, jr., Powell, Wyo.
113. Robert L. Morgenweck, jr., Powell, Wyo.
114. Virginia L. Blomgren, Deaver, Wyo.
115. Ella Hasig, Powell, Wyo.

### EVERY BABY AND HIS HEALTH HABITS.

By Harriet Anderson, Director, Publication Division, Children's Bureau.

About eight years ago the United States Children's Bureau came into existence, charged by Congress with the duty of "investigating and reporting upon all matters pertaining to the welfare of children and child life." Infant mortality, child labor, the needs of children requiring special care are only a few of the many conditions surrounding child life which have been studied and reported upon by the bureau.

Probably no publications of the Children's Bureau, widely as many of them have been used, have enjoyed the popularity of the series of pamphlets on the home care of young children. This series includes four publications—Prenatal Care, Infant Care, Child Care (the Pre-School Age), and Milk, the Indispensable Food for Children. The bureau has also prepared a set of leaflets or dodgers on the care of children, giving in simple, concise language the main facts in the proper care of the baby and the growing child. Between three and four million of the dodgers and two million pamphlets have been sent out to mothers all over the country. *Any of them may be obtained free on request.*

The following essential points in the care of the young baby are based on the more extended and detailed treatment of the subject in the pamphlets and dodgers:

The first thing that every baby needs is a good mother. A good mother is not a foolishly indulgent one, but one who is willing to learn what is best for her baby, and then intelligent and determined enough to carry it out even in face of possible opposition from grandmothers and ridicule from old-fashioned neighbors. A baby is born without habits, good or bad, and it rests with the mother to teach him proper habits in regard to eating, sleeping, bathing, and fresh air and exercise, which will lay the foundations of health throughout his life. It must be remembered that good habits should be started during the early weeks of life, for habits are quickly acquired, and it is harder to untrain a baby than to take the trouble necessary to form good habits from the beginning. **It**



is best to decide on a daily program suited to the baby's needs and the mother's convenience, and to stick to it strictly.

Every baby should, if possible, be breast fed. There is no substitute for mother's milk, and the mother should do everything in her power, by taking good care of herself, to maintain and increase her supply of milk. Even if the breast milk is insufficient, every effort should be made to retain it, for part breast milk is better than none, and even when supplemented by the bottle. A breast-fed baby runs far less risk of falling ill and has greater resistance to disease than a bottle-fed one. If the baby must be artificially fed, cow's milk is the best food for him. It must be pure and clean and kept cool until ready for use. If there is any question as to the purity of the milk it should be scalded. It must be modified, according to age and his food needs, with the greatest possible care. Feed the baby by the clock whether he is breast fed or not, and wake him regularly during the daytime for his feedings. Feedings should be three or four hours apart. Even the good effect of breast feeding may be spoiled if the baby is allowed to nurse whenever he cries and before his last meal has had time to digest. Bottle-fed babies should have fruit juices once a day after the third month and breast-fed children after the sixth. Every baby should, two or three times a day, drink cool water which has been boiled.

A young baby should sleep almost all the time, and a separate bed is an absolute necessity. He should be trained to take a long, unbroken sleep at night. In order to make this possible, his long daytime nap should be in the morning and the afternoon sleep should be short.

It is an excellent thing for the baby to sleep out of doors whenever possible. A baby needs plenty of fresh air and sunshine. Even in winter weather he may take his nap on a protected porch. He should have an airing every day, for even if the weather is stormy windows can be opened for an hour or two and the baby protected by outdoor wraps and coverings.

The baby should be dressed according to the temperature, usually lightly indoors and with additional garments to suit the temperature out of doors. The baby should wear a light or medium weight band, depending upon his age, shirt and stockings of part wool, the diaper, and a dress or night gown. In cold weather a flannel underslip should be added. In very warm weather the band, diaper, and perhaps a thin slip are quite sufficient.

Every baby should have a bath every day, and in the summer a second bath may be given at bedtime to make him comfortable for the night. The room in which the bath is given should be warm, not less than 70 degrees, and the bath itself should be 100 degrees for a very young baby, decreasing to 90 degrees for a baby of 6 months.

The baby will get plenty of exercise by crying, kicking, moving his arms about, and learning to creep. These movements should not be restricted in any way. Every baby should be taken up and held for a while each day, and should not be allowed to stay a long time in one position. Every baby needs mothering, even if he is being brought up by rule, and there is no need to deprive him of any attention consistent with the formation of good health habits.

### Mothers, Why Not Make a Study of Your Profession?

Here Are Some Useful Books.

#### *The mother—*

The Mother and Her Child, by Drs. W. L. and L. K. Sadler, A. C. McClurg & Co., Chicago, Ill., 1917; \$1.75.

The Prospective Mother, by Dr. J. M. Slemmond, D. Appleton & Co., New York City, 1918; \$1.75.

Prenatal Care, by Mrs. Max West, U. S. Children's Bureau, Washington, D. C., 1913; free.

#### *The baby—*

Infant Feeding, W. B. Saunders Co., Philadelphia, Pa.; \$2.75 (manual for nurses and doctors).

Care and Feeding of Children, D. Appleton & Co., New York City, 1918; 85 cents.

Short Talks with Young Mothers, G. P. Putnam's Sons, New York City, 1918; \$1.

Care and Feeding of Infants and Children, J. B. Lippincott Co., Philadelphia, Pa., 1916; \$2 (manual for nurses).

How to Take Care of the Baby, Bobbs-Merrill Co., Indianapolis, Ind., 1915; 75 cents.

Infant Care, by Mrs. Max West, U. S. Children's Bureau, 1914; free.

#### *The child—*

The Child, His Nature and Nurture, E. P. Dutton & Co., New York City, 1916; \$1.

Dietary for Children, National Federation of Day Nurseries, New York City (105 East Twenty-second Street); 10 cents.

Food for Young Children, U. S. Department of Agriculture, C. L. Hunt, Washington, D. C., Farmers' Bulletin 717; free.

What to Feed the Children, Dr. D. R. Mendenhall and A. L. Daniels, College of Agriculture, University of Wisconsin, Madison, Wis.; free.

School Lunches, C. L. Hunt, U. S. Department of Agriculture, Washington, D. C., Farmers' Bulletin 712, 1916; free.

Hygiene of the School Child, Dr. L. M. Terman, Houghton, Mifflin Co., Boston, Mass., 1917; \$1.75.

Child Care, Mrs. Max West, U. S. Children's Bureau, Washington, D. C., 1918; free.

*General—*

When to Send for the Doctor, by Drs. E. E. Lip-pert and Arthur Holmes, J. B. Lippincott Co., Philadelphia, Pa., 1913; \$1.25.

Maternal Mortality, by Dr. G. L. Meigs, U. S. Children's Bureau, Washington, D. C., 1917; free.

Milk, the Indispensable Food for Children, Dr. D. R. Mendenhall, U. S. Children's Bureau, Washington, D. C., 1918; free.

Feeding the Family, Mrs. M. S. Rose, the Macmillan Co., New York City, 1916; \$2.10.

Prevention of Disease and Care of the Sick, Dr. W. G. Stimpson, U. S. Public Health Service, Washington, D. C.; free.

You will find one or more books under each heading that can be had free for the asking.

**Mirandy's Babies.**

Yassum, babies sholy am a gran' institution an' I don't know what we'd do without 'em. Dey keeps us po' and humble an' makes us proud an' braggy. Dey wuks us to death, an' we're glad to slave our fingers to de bone for 'em.

We wonder what some folks sees in their runty, knockkneed, measly offspring dat makes 'em think dey is wuth raisin', an' when we looks at our own dey sure looks beautiful an' wonderful as sherriffs from de sky.

Yassum, nobody don't know whut happiness is ontill dey is held deir own baby on deir bres, an' nobody don't know whut sorrow is ontill dey has turned away from de graveyard an' left deir little baby layin' out dere alone in de cold an' snow. Me? I's knowed bof.—Dorothy Dix in Good Housekeeping.—  
L. L.

**RECLAMATION ABROAD.****Notes from Commerce Reports.****The Rhone Project, France.**

The plans for this project are quoted below from the Fortnightly Survey (Jan. 15, 1920), published by the Direction Générale des Services Français aux États-Unis, 65 Broadway, New York:

The River Rhone offers possibilities of development along three distinct lines—water power, navigation, and irrigation.

The power placed at the disposal of the French people by this river is 750,000 horsepower, equal to a saving of 5,000,000 tons of coal per annum. The active work of developing this power has started. The Rhone can be canalized so as to permit a volume traffic movement from the Rhine to the Mediterranean. When its canals are completed the river will be navigable by 1,200-ton barges and will be the most direct route from eastern France to Marseille and the Orient. The work of dredging, deepening, and constructing these canals is actually in progress.

The irrigation work undertaken will render fit for intensive cultivation over 600,000 acres of land in the vicinity of the Rhone, but particularly in the districts of Crau and Camargue.

The cost of the work done and to be done on the river will reach a total of 2,500,000,000 francs. This sum will be, to a great extent, covered in time by the sale of the hydraulic power to be converted to industrial use.

The company which has been organized to carry out all three branches of this work is guaranteed by the Government and is under its control. Its contract

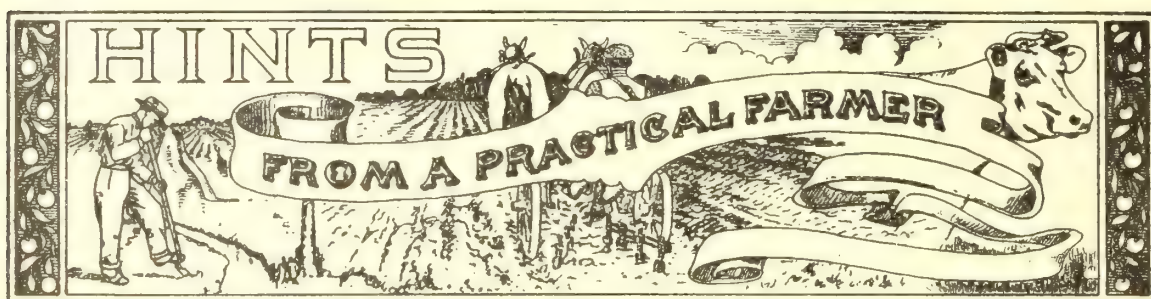
calls for it to finish the work undertaken in the shortest possible time. It has been formed by the cities of Paris and Lyon, the department of the Rhone, local chambers of commerce, consumers of hydraulic power, and important industrial concerns. Its capital is 250,000,000 francs, and under its charter it is permitted to place bonds on the market as its needs dictate to a total value not to exceed six times its capital. These debentures will bear Government indorsement, and in turn the Government is represented on the board of management of the company.

**Irrigation in Sind Province, India.**

The total irrigation from Government works in Sind has increased, since 1880, from 1,500,000 to 3,750,000 acres, and it is anticipated that when the principal works recently completed, under construction, or under consideration are in full operation an additional area of 946,000 acres will be irrigated. This extension of the irrigated area is exclusive of the Sukkur barrage scheme, which it is estimated will provide irrigation for an increase of 2,200,000 acres of annual cultivation, or double the cultivation of the whole of the central area of Sind.

It is estimated that the Sukkur barrage scheme will cost approximately \$45,000,000. The plans and estimates for the barrage portion of the project have been completed and are under consideration by the Government of Bombay. A soil survey of the tracts under command has recently been completed and the revision of the projects for the right and left bank canals has been taken in hand.





### Roots Make Milk.

Roots are among the best feeds for dairy cattle, and fortunate is that dairyman who has a plentiful supply, according to Prof. H. P. Davis, of the department of dairy husbandry, University of Idaho. Roots should be classed as watery concentrates rather than as roughage. In analysis they are high in carbohydrates and low in protein. The dry matter which they contain is very valuable, and will give as good results as grain, pound for pound.

Ease of digestion is an important reason why root crops are so valuable, and, compared with corn silage, they are almost one-third more digestible. Besides the feeding value and the ease of digestion, roots furnish succulence in almost ideal form. In this respect they rank ahead of silage, and are to be preferred if available.

Not the least important value of roots is the tonic effect upon animals. This can be noted on all classes of animals, but it applies with perhaps the greatest force to dairy cows. With plenty of beets in the ration, a dairyman has much less to fear from a cow going off feed even when she is fed large quantities of grain.

The usual ration for dairy cows varies from 25 to 50 pounds per 1,000 pounds of live weight, although larger quantities are frequently fed. Before feeding, the roots are sliced in a root chopper or are cut by hand. Almost any kind of roots can be used successfully with cows, but red beets, sugar beets, mangels, and carrots are more largely used. Turnips or rutabagas, because of their strong flavor, often taint the milk, and when used should be fed immediately after milking.

Where roots can be grown without too much cost, they furnish a very desirable addition to the dairy-cow ration, and there can be no doubt that larger milk yields will result when they are fed.

### Twelve Tips for Farmers.

G. E. Thompson, agronomist, University of Arizona, gives 12 tips for farmers:

1. Keep the farm sanitary.
2. Adapt farm practices to the conditions of the country.

3. Grow adapted crops and best varieties.
4. Locate fields and buildings conveniently.
5. Build substantial and permanent buildings.
6. Use standard machinery so that repairs will be available.
7. Do not overequip.
8. Profit by the experience of others.
9. Maintain fertility by rotation.
10. Make use of home products.
11. Keep records; know where you stand.
12. Don't get the mover's habit.

### Farm Wages Not Always Understood.

Many farmers engage their employees upon a basis somewhat similar to the example given below. The figures used are cited by the United States Department of Agriculture not as average figures for the whole country nor for any particular locality, but merely to call attention to facts often slighted by both farmer and farm employee and frequently overlooked entirely by other people.

The farmer engages a man who receives—

Monthly wages	\$50.00
Use of small house, monthly renting value	10.00
Firewood, monthly value	5.00
Milk, 2 quarts daily, 6 cents a quart	3.60
Use of garden lot ( $\frac{1}{4}$ acre), \$60 per year, monthly rate	2.00
	70.60

Upon this scale of values, often more, and seldom less, it will be seen that the farm laborer is really receiving \$70.60 per month instead of \$50. Yet, unless some form of contract is provided which definitely sets forth the values of these "extras," the laborer will fail to give them just consideration. Ask him what he receives and he will name the cash allowance alone. The employer, too, though more apt to calculate the value of the extra items, is still in doubt as to the real compensation he pays his men.

Values differ at different seasons. The fuel consumed in winter months would be much more than in the hot weather; milk is worth more in one month

than another, and a garden plat will yield more produce to one man than to another.

A contract, such as is used in some European agricultural districts, should be adapted for like conditions in this country. Upon this contract appears every item at its precise acknowledged value. The farmer knows what his help costs him; the farm laborer realizes his true value, and the general public is relieved of much harmful confusion by this simple, common-sense method.

### Sweet Clover Advised for Alkali Soils.

Sweet clover is becoming a valuable legume crop for reclaiming alkali soil, according to E. B. Hitchcock, extension soils specialist, University of Idaho. Besides returning good yields on these soils it produces good pasturage and hay. Some claims are being made that sweet clover is a weed and of little value, but experience has proven it to be one of the best crops that can be grown where alkali is a problem.

Sweet clover will grow on soils which contain sufficient alkali salts to prevent other crop growth. This statement is backed up by experiments carried out by four different agricultural experiment stations.

It is a common practice in Utah to grow sweet clover on alkali land several years before attempting to grow any other crop. Several questions arise from the fact—such questions as, Why will sweet clover grow where other crops refuse to grow? Will the sweet clover take out all of the alkali salts? When it is turned under, what does it add to the soil?

It is not known why sweet clover will grow in the presence of excessive alkali salts, but through careful experiments it has been found that sweet clover, outside of sugar beets, is the most alkali-resistant crop grown. Undoubtedly the plant absorbs a certain amount of the alkali salts in solution, but the most important feature of the clover in relieving the soil of the salt is performed by the extensive root system, which opens up the subsoil, giving better drainage and aeration. In this way the alkali salts are drained out through the lower layers. The holes made by the roots are left partly filled with fibrous substance, which permits rapid drainage. The fact that sweet clover does bring about good drainage is very well illustrated in the spring, for a field growing this crop is in condition to plow much earlier than the adjoining fields not growing clover.

After the clover has been used as a pasture or cut for hay for a period of two years, it is well to turn the last crop of the second year under as a green manure crop. This furnishes a large amount of organic matter to the soil, which is quite necessary for a soil that has lain in a dead state for some time. The sweet clover plant decays very quickly, which is a very important factor from the standpoint of the following crops.

### SENSIBLE IRRIGATION.<sup>1</sup>

By J. F. Jarrell.

When water becomes scarce it is up to all of us to adjust ourselves to the conditions and make the best possible use of the available supply.

The need of adequate division boxes is felt and the greed of our neighbors is seen more than ever when the water is low.

There are cases where some one who owns a large share in the ditch controls the amount of water allowed to the other shareholders. This works all right until there is a shortage of water; then the one who has been in the habit of dictating the policy of the distribution of the water becomes a greed controlled water hog, and the other fellows suffer. I am sure that if everyone interested in a ditch fully realized at all times exactly what was due him and was allowed only his portion of water to use on his place, he would become accustomed to it and not expect to borrow water from a half dozen neighbors in order to rush his work through.

Water users under all ditches should diversify their crops so the water would not be needed all at once. We will suppose the crops grown are wheat, beets, alfalfa, corn, and other grain. That would distribute the need of water over the whole season and a farmer could count on getting his share of the water to apply to his place when needed. Farmers waste water in irrigating to a greater extent than is realized by most men. Experiments conducted in California brought out the fact that many farmers were using twice the amount of water that was necessary. A more sensible use of the water irrigated more acres in California and it will do the same in Colorado.

Great quantities of waters are wasted every year, soaking up roadways and seeping away through the subsoil on account of not sufficient attention being paid to the action of the water on the fields.

Irrigation requires constant attention to the detail of making the water work to the best advantage. Some irrigators try to work 24 hours per day and they usually succeed in working about 6 hours on account of trying to snatch a little sleep now and then. In this way water is wasted while the irrigator is asleep. It will pay the farmer to keep his irrigator busy rather than try to have him feel that there is very little to do except turn the water in.

I have seen men go out to irrigate and after turning the water into the field they would pay no attention whatever to its action on the field, but would take up a station at the lower edge of the field and as soon as the water reached that point they would shut it out, claiming the field was irrigated.

<sup>1</sup> Reprinted from "Through the Leaves."



Water running in its natural course down the stream is of little benefit to a farm; it is only a step in the direction of what we want when we construct a ditch. Another step is to put in suitable laterals and from these sublaterals located at the proper place to convey the water where it is needed. The stream, the ditch, the lateral, and the sublateral require very little attention after being put in shape to handle a season's water, but the spreading of the water on the field does require very careful attention. Then there is the waste water, which, like a dead man, is not of much use, but has to be disposed of. This requires waste ditches of suitable size and

location to handle the waste water. Some people seem to think that the county roads are built especially to take the waste water from their farms; most farmers, at some time or other, are guilty of wetting the roads to the annoyance of those who use them. What a foolish thing to do.

Good streams, ditches, laterals, sublaterals, and sensible men to handle the water in the field will make the prairies a good place in which to live. The same combination of streams, ditches, laterals, etc., with foolish, careless men to handle them, will make the same section what some one has said war is.

### FEEDING HOGS.<sup>1</sup>

By W. A. Linklater, Superintendent Western Washington Experiment Station.

In western Washington hogs are kept mainly by three classes of people at the present time—first, families who raise one or two pigs for their own use; second, persons who keep one or more brood sows for the purpose of raising small pigs for sale; third, persons who go into hog fattening as a business, having available considerable quantities of cheap feeds, such as slops. Our farmers have to a large extent quit raising hogs. There is, consequently, very little demand for pure-bred or high-grade pigs, as might be expected, considering the classes of people who are raising hogs. People who are raising small pigs for sale can sell a very ordinary grade pig practically as well as if it were well bred. The persons who want to buy one or two pigs to raise for home consumption generally pay little attention to the quality of the pigs, so long as they are thrifty looking. The man who has a hog-fattening plant buys pigs of most any age and wherever he can get them, paying little attention to whether these pigs are high-grade or not.

It can not be established that one breed of swine will make gains more economically than another, but there is no doubt that well-bred pigs will mature more quickly and make more economical gains than scrub pigs, and it is, consequently, unfortunate that there is not more interest in this section in hogs of good breeding.

It is not a safe business venture to attempt to raise hogs in western Washington on bought grain alone. Some comparatively cheap supplementary feed must be available to insure success. This may be slops, skim milk, or dairy by-products, roots, kale or good clover pasture. With the exception of slops, the other supplementary feeds need to have grain fed with them, and even in the case of slops no doubt grain can often be fed to advantage. Such supplementary feeds are, or can be, produced on practically every farm in

western Washington. It is practical and profitable to arrange for pasture for all ages of hogs throughout the summer. Good clover or grass pasture commonly will only last till early July, and this needs to be supplemented then with some spring-sown forage, such as rape or kale which should be seeded at several different times so as to give fresh pasture. Root crops, such as mangels, may be hogged-off in the field or may be stored for late fall and winter feeding. These feeds, together with skim milk or other dairy products, if available, surplus vegetables from the kitchen, garden, and slops from the house can well make a big part of the pigs' ration, but some grain should be adapted to the successful digestion of coarse feeds such as ground oats, bran and other feeds which contain a large amount of fiber. Although stock hogs and mature breeding hogs will do fairly well on feeds of this kind, young pigs and fattening hogs can not be fed coarse feeds of this kind profitably. Corn, barley, low-grade wheat or peas should be the basis of either a growing or a fattening ration. To these may be added shorts or middlings, oil meal and similar feeds, but where supplementary feeds, such as slops, dairy by-products or roots are fed, no supplementary feed is needed—just the fat-producing grain like corn, barley, wheat or peas.

When hogs are on good pasture or are fed roots, skim milk, or other dairy by-products, 2 pounds of grain per 100 pounds of live weight daily is a fairly satisfactory ration. Brood sows need practically double this amount of grain when nursing a litter, but very little grain when dry if they have good pasture, roots or similar feed.

When fattening hogs it is generally best to put them up in a small lot with comfortable sleeping quarters, though sometimes it may be profitable to run them in a field to hog-off a crop. At this station we have gotten very good returns from hogging-off field peas. In a cooperative experiment which we conducted in

<sup>1</sup> From Northwest Dairyman and Horticulturist.

1915 at the A. L. Brown farm, Nisqually, quite satisfactory gains were made by hogs turned into root fields and fed grain in addition. Mangels, rutabagas, kale, and rape were compared as was also the plan of feeding a full ration of grain as compared with half a ration of grain when the hogs had the run of the root fields. Of these different crops mangels seemed to be the best adapted for hogging-off and the plan of feeding a full ration of grain, or between three and four pounds of grain per 100 pounds live weight, to the pigs having the run of the root fields proved more satisfactory than feeding half this amount of grain. In this experiment the hogs required about 25 pounds of mangels and 3.3 pounds of grain for each pound of gain.

At this station in 1915 a hog-fattening experiment was conducted for the purpose of comparing the efficiency of various supplementary feeds when used in conjunction with ground barley. Uniform pigs weighing slightly over 100 pounds were divided into five different lots and were fed as follows: Lot I on ground barley alone; Lot II on ground barley 9 parts by weight and tankage 1 part; Lot III on ground barley 4 parts by weight, oil meal 1 part; Lot IV on ground barley 4 parts by weight, alfalfa meal 1 part; and Lot V on ground barley 1 part by weight and skim milk  $2\frac{1}{2}$  parts. The table which follows gives the results of this feeding test:

	Weight Sept. 17.	Weight Oct. 25.	Average daily gain per pig.	Grain per 100 pounds gain.
Lot I.....	605	833	1.0	434 pounds.
Lot II.....	609	880	1.2	382 pounds.
Lot III.....	606	885	1.2	370 pounds.
Lot IV.....	607	859	1.1	410 pounds.
Lot V.....	605	930	1.4	260 pounds grain. 650 pounds skim milk.

Lot V, fed skim milk with the ground barley, made the most economical gains, as will be noted, and in the case of Lots II, III, and IV considerable saving was effected in the amount of grain required for 100 pounds gain through the addition of protein-rich feeds to supplement the ground barley.

Whenever slops from hotels, restaurants, or private kitchens can be obtained cheaply, in cities or elsewhere, they generally make a very profitable feed for hogs. Often they can be satisfactorily fed without any grain in addition, though they should usually be cooked. The main problem of the hog feeder who uses slops is to make sure that poisonous or unpalatable substance do not find their way into the slops. The University of Idaho, reporting recently on a slop-feeding experiment conducted at that institution in which the slops from soldiers' training camps were fed, state that they have obtained from  $1\frac{1}{2}$  to 2 pounds a day in feeding slops without grain.

## BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture,  
Washington, D. C.

### FARMERS' BULLETINS.

No. 1061. *Harlequin cabbage bug and its control.*—This bug, if permitted to propagate unmolested in seasons which favor its increase, is certain to destroy a portion, if not all, of the fields which it infests.

No. 1082. *Home supplies furnished by the farm.*—It is the purpose of this illustrated bulletin to point out the importance of the food, fuel, and shelter furnished the family by the farm. These contributions are not a cash receipt from the farm business, but they enable the farmer to reduce materially the cash cost of living and to continue in business when the financial summary of his operations may show only a small margin of profit at the end of the year, in itself insufficient for the support of his family.

No. 567. *Sugar-beet growing under irrigation.*—The successful production of sugar beets under irrigation depends not only upon an adequate supply of irrigating water, but upon a suitable system of crop rotation, a thorough preparation of the seed bed, careful blocking and thinning, timely and thorough cultivation, and a supply of live stock which will balance with the crop production of the farm and include the utilization of beet tops, pulp, and waste molasses. This illustrated bulletin should be of interest to farmers in the Western States who are interested in growing sugar beets.

No. 743. *The feeding of dairy cows.*—Successful feeding of dairy cows from an economic standpoint involves the providing of an abundant supply of palatable, nutritious feed at the minimum cost per unit of feed and supplying it to the cow in such way as to secure the largest production for feed consumed. This bulletin gives some factors involved in the economical selection of feeds and guides the producer in supplying them to the cows.

No. 810. *Equipment for farm sheep raising.*—The object of this illustrated bulletin is to furnish a practical guide for the equipping of farms for sheep raising. Wide differences in climatic conditions render it impracticable to suggest a particular type of building for all sections; therefore a number of types of barns and sheds are presented.

No. 904. *Fire prevention and fire fighting on the farm.*—Practically every fire, except that of incendiary origin, is preventable; some carelessness or neglect is usually responsible. Protection sufficient to prevent a fire is cheap compared with the loss entailed by the average farm fire. This bulletin presents facts and methods which will assist farmers in reducing the large annual fire bill of the Nation, which they must assist in paying.



No. 1072. *Prickly pear as stock feed.*—Prickly pears may be fed to live stock in a green, succulent condition right from the field, as needed. They require no curing, housing, or storage. In this they offer an advantage over most crops.

### Distributed by State Agricultural Colleges.

OREGON BULLETINS, CORVALLIS, OREG.

No. 167. *The improvement and irrigation requirement of wild meadow and tule land.*—The wild

meadow and tule lands of eastern Oregon total over 515,000 acres. The wild meadow lands comprise over one-third of the irrigated area of the State, and the control of irrigation and drainage and the substitution of cultivated forage plants for the native grasses and tules will add a great deal to the forage production of Oregon.

No. 168. *Survey of typical Oregon farmers' creameries.*—The factors that contribute to success or failure are discussed in this bulletin.

## POTATO CULTURE, SUN RIVER PROJECT.

By Geo. O. Sanford, Project Manager.

Mr. H. M. Louis, the potato man, who has been doing business on the Shoshone project since 1918, visited Sun River project recently and as a result of meetings held on the project the potato industry has been started in a substantial manner, and Mr. Louis will arrange to market the potato crop this coming fall.

Mr. Louis is now doing business at three points in the Northwest—on the Shoshone project; at Bridger, in the Clarks Fork, in the Yellowstone; and in the Flathead Valley, with headquarters at Kalispell. In each of these places a company has been organized and the farmers are being financed by the company so as to secure seed and implements. Mr. Louis stated that he was not in a position to finance the farmers on Sun River project this year, but that if 300 acres were contracted he would sell the potatoes next fall, and if 500 acres were contracted he would place a field man on the project to work with the farmers this summer.

A meeting was held at Simms on March 15, at which about 30 water users were present. Mr. Louis explained the conditions under which he would market the crop, which would be sold by him on a 10 per cent commission at the best market price possible. At Fairfield a meeting was held the next afternoon, and 67 water users were present. The farmers showed considerable enthusiasm and about 60 acres were signed up that afternoon, all small areas of 2 or 3 acres, which is a much better way to start than in attempting to handle too much the first year. The 300 acres are assured, and it may be possible to increase the acreage to 500 and thus receive without any expense to the farmers the benefits of an experienced field man.

A canvas is being made by local water users, in which this office is giving some assistance, with a view to ascertaining more definitely how many acres will be planted, how much seed there is in the valley, and how much seed will have to be purchased. Mr.

Louis will advise where the best seed can be obtained. There is a pretty good supply of Netted Gem potatoes at Simms, and Mr. Louis said it was as good seed as could be purchased anywhere in the country. The farmers will probably confine their efforts to Netted Gems, White Pearls, and Rural New Yorkers. Seed is now 5 cents per pound at Simms. The local banks will assist the farmers in securing seed.

It is hoped that the start now being made in the potato industry will turn out successfully this year, as it will mean that a considerably larger acreage will be planted next year. The talk given by Mr. Louis to the farmers left them in a very hopeful frame of mind, and his recital of the success of some of the farmers on the Shoshone project made a most excellent impression. Two of the successful farmers from Shoshone were at the meeting at Fairfield and made a few remarks, telling of the success of the potato industry around Powell.

### PROJECT POLICIES.

Mr. B. E. Hayden, project manager of the Belle Fourche project, South Dakota, has enunciated certain general policies with reference to the relations between his office and the water users, which crystallize the subject so clearly and concisely that we believe they might well be posted in each of our project offices for the guidance of our employees and the water users in their mutual relations. These policies are given by Mr. Hayden as follows:

1. To maintain the irrigation system in the best possible condition consistent with reasonable expenditures and at all times in such repair as to be able to give satisfactory service to the farmer.

2. To instruct and encourage the farmer in the best methods of irrigation, and to give advice relative to handling unavoidable waste and seepage water.

3. To protect the interests of the United States by keeping the irrigation system in good repair and forcing collection on all delinquent charges.

4. To give the water user, always, courteous and just treatment in all matters within our jurisdiction.

### SUCCESSFUL IRRIGATED PASTURES.

Prepared by U. S. Department of Agriculture.

In these times of high-priced grain and hay it is more than ever advisable for the irrigation farmer to look into the possibility of carrying live stock through the summer months on mixed grass pastures. The hogs, of course, make good profits on alfalfa pasture, but the cows, sheep, and horses must have hay and grain if good pasture is not available. Consequently, good pastures are more than ever worth while.

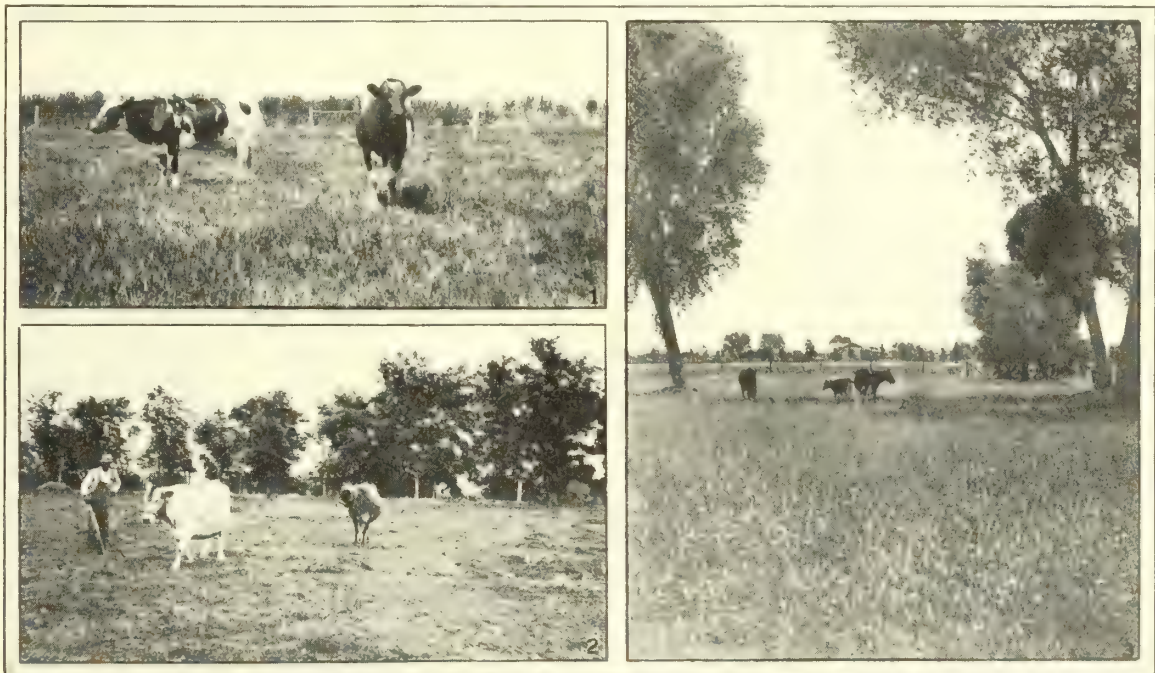
A good pasture of mixed grasses and clovers should carry at least two cows per acre during the summer period, which means at least five months on the northern projects and a longer period in the South. These two cows, if kept in the corral, will need at least a ton of alfalfa hay per month, besides some grain, if they are to do their best.

Calculating a ton of hay as worth \$10 or \$12, an acre of good pasture is worth at least \$50 or \$60 for

the season. It requires less work to care for a pasture than to harvest and stack three crops of alfalfa hay. Land that will produce 5 tons of alfalfa hay has the making of good pasture.

From every standpoint, a good pasture is worth while, but remember it takes good land to make a good pasture and it is not worth while to try to make a good pasture on poor, rough, or waste land. If possible, the pasture should be on the good land that comes right up by the house where it can be looked after easily and enjoyed daily. There is not any better setting for the farmstead than a stretch of rich, green pasture, bordered with shade trees. A good pasture, well located, means pleasure as well as profit for the owner.

The recipe for a mixed grass pasture may be made up variously like the recipes for cakes. Some pasture



1. On the heavy soils of the Belle Fourche project the pastures get a little ahead of the cows at times. 2. Even the sandy lands in the Columbia River Valley carry good pastures when well prepared and frequently irrigated. 3. In the hot southwest, Sudan grass and Bermuda grass supplement each other and give a long pasture season. A few trees give grateful shelter from the sun.



recipes call for six or eight grasses, and two or three kinds of clover; others are less elaborate and give equally good results. Sometimes a little local experimenting helps to determine what varieties and combinations give the best results. But the main thing is to get the pasture.

The advantages of pasturing meadows after the second hay crop has been cut should not be overlooked. Irrigated valleys, particularly in the Northwest, are frequently bordered by open-range country, on which cattle, horses, or bands of sheep graze. In the fall the feed on the range often becomes short, and the stock is brought into the valleys for feed. The irrigated meadows are frequently rented as pastures for the range stock after the second crop of hay has been cut. On some farms the meadows are used only to pasture such stock as may be kept on the farm; on a smaller number of the farms the meadows are not pastured at all.

A meadow composed of a mixture of timothy and alfalfa or clover will generally produce more pasturage than a meadow of timothy alone. A mixture of timothy and either clover or alfalfa makes a better pasture than either of these two legumes alone. The sheep or cattle are less likely to become bloated if there is a considerable mixture of grass growing in the field than if the clover or alfalfa is growing alone.

When the meadows are rented for pasture they are usually pastured by either sheep or cattle, most frequently by sheep. When a meadow is rented to a sheepman he ordinarily does not put the sheep in the field immediately after the second crop has been harvested, but waits until some time in the fall, when there will be more feed available. He then brings in a band of sheep and keeps them there until all the grass has been grazed down. Usually the sheep are in one field for from a few days to one or two weeks, then they are taken elsewhere for feed. After the sheep have been removed from the field the timothy plants and the clover or alfalfa plants have a short time in which to develop some growth before winter.

Some farmers maintain that any feed obtained from the field in the form of fall pasture is at the expense of the following year's hay crop. Other farmers pasture a limited number of live stock owned on the farm in the meadows, but do not allow the grass to be grazed closely. Weeds of various kinds are likely to gain a foothold in a meadow which has been pastured too closely. Pasturing any kind of stock too soon after the fields have been irrigated when the soil is yet soft and the plants are easily injured by trampling is particularly harmful. All stock should be kept off the fields in the spring. Most of the timothy meadows are pastured to a greater or less extent in the fall; if care is used to keep the stock off the field when the soil is wet, and if the grass is not grazed too closely, the use of the meadows for pasture at this time does not seem to damage them to a very great extent.

## SURVEY OF TYPICAL OREGON FARMERS' CREAMERIES.

The Bureau of Organization and Markets of the Oregon Agricultural College Experiment Station conducted an investigation recently to determine whether or not the farmers' creameries of the State have been unsuccessful, and to determine as far as possible the causes that contributed to success or failure. The results of the investigation of 17 creameries, located in the Willamette Valley and in the coast region, are embodied in Bulletin No. 168, by Eric Englund, field agent in dairy marketing. It is believed that the following summary and conclusions will be read with interest by our water users and may well lead them to profit by the success and prevent them from repeating the mistakes of others.

*Reasons for organizing.*—The principal motives that led to the organization of these creameries were a desire on the part of the farmers to create a better market for their products, and the belief that through organization they could compete successfully with the centralizers who they felt were controlling the price of both butter and butter fat. It is difficult to determine to what extent farmers' creameries have been responsible for the high prices paid for butter fat at present as compared with a few years ago, but it is reasonable to assume that the prices are now a good deal higher than they would have been had it not been for the farmers' creameries.

*Misplaced creameries.*—The majority of the creameries have been promoted without adequate preliminary steps, and as a result plants have been put up where the value of available business was not sufficient to justify the organization of a creamery. In a few cases this mistake has been largely responsible for failure.

*Volume of business.*—Volume of business is a most important factor in the success of a creamery. The average of 10 creameries for the year 1918 was 177,231 pounds of butter fat. Competition, lack of loyalty among the farmers to their own creamery, inefficient management, and decrease in production during the last few years appear to be the chief reasons for the small volume of business of several plants.

*Importance of "overrun."*—The "overrun" is the difference between the amount of butter fat paid for and the butter manufactured. Its importance has not been sufficiently emphasized by several of the creameries and considerable loss has been incurred on account of not keeping the overrun up to an average of 24 per cent. Experts in the dairy department of the Oregon Agricultural College state that it is possible to obtain an overrun of 24 per cent and still keep the moisture content within the 16 per cent limit prescribed by law.

*Importance of print trade.*—The butter manufactured by Oregon farmers' creameries is marketed

principally in Portland. The most successful creameries have made special effort to develop the print trade, for the price of prints is considerably higher than the price of cubes.

*Sales problem of the small creamery.*—The small creameries are at a great disadvantage on the market because their limited volume of business makes it impracticable for them to maintain a salesman to look after their interests. Though cooperative sales agencies have been tried and have failed, they will be tried again, in all probability, until the problem of cooperative selling has been solved.

*The manager.*—Next to volume of business, management appears to be the most important factor in the success of a creamery. From the nature of the business, the small farmers' creamery must be a one-man plant. That is, the butter maker must also act as business manager. He must be a "mixer" to attract and hold patronage, and must have a business training as well. It is not economical, therefore, to have a high-salaried butter maker spend a good share of his time in work that could be done by cheaper labor while the managerial duties are neglected. A little extra help at the rough work around the plant would in most cases be sound economy.

*Bookkeeping.*—Poor bookkeeping is one of the most common faults of the creameries. Of the 17 creameries investigated only 5 have records that meet the needs of the business. In many cases the records are so inadequate that it has been impossible to determine the exact status of the business.

*Cooperation and leadership.*—It appears to be difficult for the farmers to stand together for a common purpose unless they can clearly see that they will reap immediate gain from it. In many cases farmers have discontinued patronizing their own creamery for the sake of 1 cent or a fraction of a cent more for a pound of butter fat paid at the time by some large, privately owned creamery. Efforts have been made with considerable success to keep the farmers together and to foster interest in the creamery by holding a general gathering of all farmers in the community at the time of the stockholders' annual meeting. Good local leadership is highly important in keeping the farmers together. Division among the farmers along lines of nationality has in some cases been a serious handicap.

*Causes of failure.*—Several farmers' creameries in Oregon have failed. The following appear to be the factors that have contributed to the failure, arranged in the order of their importance. The converse of these are the factors that have contributed to success:

1. Small volume of business.
2. Inefficient management.
3. Severe competition.
4. Poor system of accounting.
5. Lack of loyalty among the farmers.
6. Insufficient capital.

## LAND OPENING ON FORT LARAMIE UNIT, NORTH PLATTE PROJECT, NEBR.-WYO.

A public order was signed by the Secretary of the Interior on January 15, 1920, opening for entry the fifth unit of the North Platte project, containing 80 farm units located on the Fort Laramie unit, and stating that applications would be received at Torrington, Wyo., between the dates of February 28 and March 5, 1920, at 9 o'clock a. m.

As soon as this order was made public the volume of correspondence received at the Mitchell office, relative to land, which had been steadily increasing for over a year, began to assume formidable proportions. On February 5, after the work of answering such correspondence had been well systematized and about 1,500 letters had been sent out, a telegram was received from the Washington office stating that "Congress has passed resolution 20 giving soldiers 60 days' preferred right of entry. Will doubtless become law and apply to forthcoming Torrington opening." This fact was immediately given to the public and served to greatly increase the number of inquiries made until the office was fairly swamped with visitors and inquiries made by mail, telephone, and telegraph.

For the convenience of the prospective applicants a small map was prepared in the project office showing on one sheet all of the vacant units to be opened and the roads and other general features of the country. This map was printed and sold so rapidly that before the drawing 4,000 copies had been disposed of.

A copy of this map on a larger scale, 1,000 feet to the inch, making a map about 7 by 10 feet in size, was prepared and hung on the wall of the room at Torrington, where applications were received. In addition this map showed the topography of each unit on a contour interval of 2 feet. A tabulation was made on this map for posting the number of applications received for each unit and these figures were kept posted from day to day.

(Continued on page 220.)

### 7. Extension of too much credit.

*Farmers' creameries generally successful.*—Although it is true that several country creameries in Oregon have failed during the last few years, investigation does not show that farmers' creameries have generally been unsuccessful. On the contrary, the experience of the 17 cases studied would indicate that cooperative creameries have in the majority of instances been successful, particularly in localities where careful preliminary surveys were made to determine the amount of business available and the attitude of the people toward cooperation. Such a survey made it possible to go ahead with organization with reasonable assurance that the creamery could successfully meet a real need in the community.



### North Platte Land Opening.

(Continued from page 219.)

On February 28 an office for receiving applications was opened in the county courthouse at Torrington, the court room being secured for that purpose through the efforts of the Torrington Commercial Club. The work of the first day was handled by six employees from the Mitchell office and offered a good opportunity to try out the system which had been devised and determine the force necessary to handle a large number of applications. After that day the force was gradually increased as became necessary, until by the last two days the number had reached 17 and the method of handling the work had been brought to the highest efficiency. Each day the number of applications presented in person was enough to keep the entire force busy, with little or no time to handle the mail applications which came in ever-increasing numbers. In order to take care of these applications as they came in a notice was posted that the office would be open from 9 a. m. to 5 p. m. This furnished an opportunity to handle the mail between 7:30 and 9 a. m. and 5 p. m., and as late as necessary to clean up this work. By Thursday, the day before the drawing, the amount of work had become so great and the mail applications came in so fast that it was thought necessary to keep the office open until 9 p. m. and to work all night to handle the large amount of mail which had accumulated. The Mitchell office and the field offices were therefore called upon for more help and enough assistance was secured to relieve the worn-out regular force at 7 p. m. and work until the regular force could return in the morning. The night force worked all night on mail applications without completing the work. The doors were closed promptly at 9 a. m. on the 5th and the remaining time from then until 2 p. m., the time set for the drawing, was required to dispose of the applicants in line at 9 o'clock, finish with the mail applications, and prepare for the drawing.

At the opening it was required that each applicant have all of the necessary papers completely filled out before presenting them for acceptance. A long table was placed near the door at one end of the room, at which was stationed J. K. Rohrer, assistant engineer, who gave out blanks and information and examined applications and prevented applicants who did not have applications properly executed from staying in line. If the papers were correct in every detail, the application blank was initialed at the margin by Mr. Rohrer and the applicant passed on. If the amount of deposit to be furnished was the exact amount required, it was attached to the application blank and a red check mark made above Mr. Rohrer's initials.

The deposit, if it was made by draft, cashier's check, or certified check, remained attached to the applica-

tion through the whole routine. A large number of deposits were made in actual cash, and, in order to avoid holding up the whole line while this was being counted and change was being made, a man was stationed near the head of the line and applicants who were to make deposits in cash were requested to step out of line until the money could be counted and change made. After each deposit had been counted the correct amount of the deposit was placed in an envelope and sealed, and the applicant's name, etc., placed on the outside. The money was kept here, and the initials of the person receiving it were written on the margin of the application with the amount received, to be used in the preparation of the receipt. The applicant then stepped back into line and passed on.

The application was then handed to a man who gave it a serial number. The numbers were stamped on the application with a Bates automatic numbering machine set to stamp in quadruplicate, the same number being stamped on the application, the card to be used in the drawing, and on the receipt and duplicate receipt. The unit number was here also added to the card and the two receipts.

All papers were then handed to the next man, who added the name and address to the card and passed the card to another man, who put it into an envelope, and after sealing it deposited it in the box. All other papers were then passed back to one of three stenographers who typed the two receipts.

All papers were then passed to another person who made the entries in the cashbook, making all entries in the order of the serial numbers on the applications.

The papers were then passed to the last two in line, where the receipts were signed and the proper notation made at the bottom of the application blank.

The applicant was then given his copy of the receipt and passed out at the other door.

The papers, together with the deposits, were then taken to the jury room, just off from the court room, where O. K. Barnes, fiscal agent, with from two to six assistants, checked the cashbook sheets and prepared the money for deposit.

Mail was placed on a table near the head of the line and opened as opportunity offered, the applications being examined, initialed, and checked in the same manner as was done by Mr. Rohrer, and whenever opportunity offered were passed through the regular process of registration.

As soon as the applications had all been listed and the cards were in the boxes the court room was arranged for the drawing. Before putting any cards into the boxes they had been taken to the First National Bank, of Torrington, and locked and the keys deposited with the bank officials. The boxes, together with all valuable papers, were kept in the vault at the bank when not in use at the court room.

Before 2 p. m., the time set for the drawing, a large crowd had filled the corridors of the courthouse, and promptly at 2 p. m. the doors were opened. After a short preliminary address by Andrew Weiss, project manager, he introduced H. W. Bashore, assistant project manager, who, on being handed the keys by E. P. Perry, of the First National Bank, of Torrington, opened the two boxes and transferred the contents to a large barrel churn which had been borrowed for the purpose and, after putting on the cover, thoroughly mixed the envelopes containing the cards. The cover was then removed by Clyde Smith, president of the Torrington Commercial Club, who then drew out the envelopes and, after opening them, passed the cards to Mr. Weiss, who called the application and unit numbers and also the names and addresses of the successful applicants. The numbers as called were tabulated for each unit by two assistant engineers independently. A large blackboard had been arranged, on which the names of the successful applicants were posted as they were drawn. The drawing was continued until about 9 p. m., and at that time, as a large number had been drawn for each unit, the drawing was discontinued, and was completed for the purpose of record after the forces had moved back to Mitchell.

A part of the force remained at Torrington during the next day to make arrangements for returning deposits, furnish approved water-rental applications to the successful applicants, and pack records and equipment to be taken to Mitchell. After the return to Mitchell a large force was required on checking and completing records and returning deposits. This work was completed on March 31, 1920.

The principal figures relative to the opening are as follows:

Number of farm units opened for entry	80
Irrigable area included in the farm units-----acres--	5078.9
Number of letters of inquiry received and answered-----	10,000
Greatest number received and answered in one day-----	726
Number of maps sold-----	4,000
Number of applications--	
Received first day-----	139
Received second day-----	378
Received third day-----	295
Received fourth day-----	699
Received fifth day-----	850
Handled night of fifth day--	565
Received sixth day-----	325
Received after drawing-----	47
Number of applications received by mail-----	3,298
Greatest number received by mail in one day-----	1,165
Largest number of applications for one unit-----	375
Smallest number of applications for one unit-----	176
	5

Amount of money deposited by applicants-----	\$1,192,943.62
Amount of money to be covered into the reclamation fund for water rental---	\$25,902.39
Amount of money to be covered into the reclamation fund for improvements (a greater part of this amount was paid by successful applicants after the drawing and is not included in the above total)-----	\$1,943.55

The change in the opening which granted preference rights to soldiers was received with almost universal commendation and approval. The new regulations were so thoroughly advertised that no complication resulted and it was not necessary to reject a single application for the reason that the applicant was not qualified.

The crowd during the days of receiving applications and at the drawing was very good natured at all times and very appreciative. The housing and feeding facilities of the city of Torrington were crowded to the fullest capacity, and, in fact, to overflowing, and the city is to be congratulated on the fact that the people responded in such a generous and whole-hearted manner to meet the situation that universal commendation was heard on all sides.

The opening was under the general charge of H. C. Stetson, office engineer; O. K. Barnes, fiscal agent, was in charge of the finances. Practically all of the office employees assisted at the opening and a great deal of credit is due to each one for the generous and faithful service rendered during the strenuous and trying days of the opening.

### Successful Applicant at North Platte Opening Gives Views.

The following extracts are from a letter received recently by Mr. C. H. Fitch, chief clerk of the Reclamation Service, from Capt. James E. Fitzpatrick, one of the 80 successful applications out of 3,298 ex-service men who applied for a farm at the opening on the North Platte project, Nebraska-Wyoming, on March 5:

MY DEAR MR. FITCH: At the instance of Miss deLauder, of the Internal Revenue Bureau, it may be of interest to you to have some first-hand impressions of a person interested in and fortunate enough to have been successful in the recent land drawing held at Torrington, Wyo., for the benefit of ex-service men.

Real sincere interest in this small project is evidenced by the fact that 3,298 applications were made for 80 parcels of land, and it seems a great pity that only 1 man in 40 should have been successful in obtaining the right to homestead a piece of this land. Careful and conservative estimates by persons on the ground place at 2,000 the number of men who came to Wyoming without any definite information



regarding this land drawing; these men did not or could not make entry on this land for various reasons; some came without any papers showing their service, many of them had no money or capital, and many were under a lazy impression that the only interest they had to show in the matter was to indicate their willingness to accept some land from a beneficent Government and all details would be taken care of for them.

It is almost a unanimous opinion among ex-service men of this section and also among men from all sections who came to this land drawing that the opening of land for settlement would be much more preferable at this time than any cash bonus for which different organizations are now besieging Congress. Further taxation or the issuance of more bonds is considered out of the question, but at the same time it must be considered that a large percentage of the ex-service men who wish to make themselves a home on new land are without any funds or capital with which to make a start, even though they have the land.

That 3,298 applications for 80 parcels of land, that 2,000 more came to Wyoming and were unable to make entry, and that as many more inquiries were received by mail surely gives the lie to those persons who are loudly asserting that the ex-service men are looking for something "soft" and will not work or join the "back to the soil" movement, and is evidence that lands made available for entry will be most enthusiastically taken up.

It is but natural that criticisms should have arisen when there was such a large number of unsuccessful applicants and that these criticisms and this dissatisfaction should have overshadowed any benefits secured by a very small percentage of the total, and it is to be hoped that future projects shall be developed after considering such things and realizing that there is a real and sincere desire on the part of ex-service men to secure a home; that approximately 5,000 men should each spend from \$100 to \$500 for traveling expenses and that each one of 3,298 should deposit an average of \$500 as a symbol of good faith in his desire to secure such a home seems to be clear enough evidence that such governmental aid in this direction is surely appreciated.

Most men who have any capital and are able to thoroughly digest and understand all the rules and regulations now promulgated are not looking for farms or homesteads. Business in a city appeals to them more. It is the man who has never traveled before the war and who knew practically nothing of how many ways were open for him to better himself that is now seeking a new home and is willing to settle down and nurse and coddle and whittle out a living for himself and his family that is interested in these projects.

It may be that the Reclamation Service has many more projects in mind; it is to be hoped that the Interior Department and Congress can make some immediate arrangements to care for the very large number of willing workers who are really sincere in their desire to develop some of the immense amount of land that only awaits definite and concerted action by the proper authority.

The enthusiasm and interest shown in this small project should be of great interest to the authorities who have the power to carry forward other projects larger and suitable to care for the very large percentage of men who are interested in such things.

Very sincerely,

JAMES E. FITZPATRICK,  
*Captain, Guernsey, Wyo.*

## THE SAND HILLS.

By Ina Salome Delo, Laramie, Wyo.

[NOTE. In the letter inclosing this poem Miss Delo writes as follows: "The inclosed lines were penned as a true description of the sand hills that are being reclaimed along the North Platte River. I lived for several years at Paxton, Nebr., and became very familiar with the country and the heroic people who are bringing this land under cultivation."]

Have you seen the land where rolling hills

Lift crests of sand in mountain waves?

Swift at its feet the river glides—

Wild grass bends o'er forgotten graves.

Shifting sand in a wind-swept land!

Lone house of sod, a sentinel grim!

Cowboys riding with quirt and gun,

Trails that wind in the shadows dim.

Lean coyotes slink 'mid cactus blooms;

And rattlers coil where soap weed spires

Raise creamy bells to the vault of blue;

Throbbing heat of the sun's red fires!

Lonely land where the sand hills lie!

Brave are the hearts that by night would fain

Conquer the soil with unceasing toil,

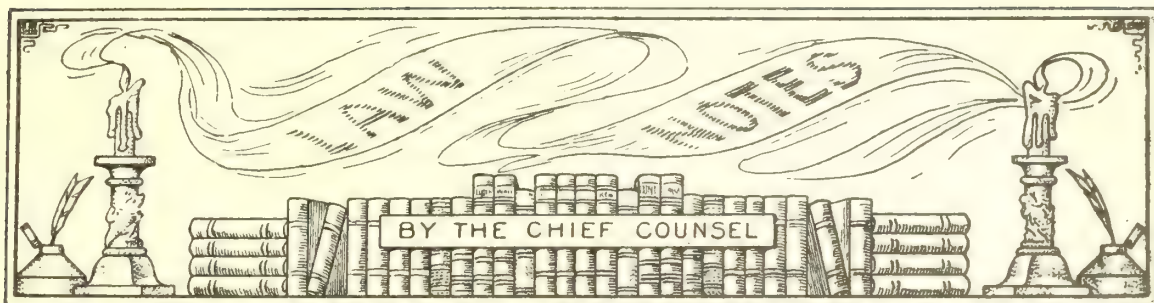
And cause the desert to bloom again.

## OUR NEW CHIEF ENGINEER.

Effective April 1, 1920, the official designation of Mr. F. E. Weymouth has been changed from chief of construction to chief engineer.

## SMITH-DAVIS.

Mr. Arthur P. Davis, Director of the Reclamation Service, announces the marriage of his daughter, Dorothy May, and Mr. Philip Hilmyer Smith on March 29, 1920, in New York City.



### West Side Irrigation Co. Loses Motion Against Government.

Prior to the adoption by the Government of the Yakima irrigation project in Washington appropriations of water from the Yakima River had been made in excess of the low-water flow. As a condition precedent to the adoption of the project by the United States, the various water users upon the river were required to execute agreements limiting their rights of appropriation, so that the total amount claimed would not exceed at any time the natural flow of the river. The West Side Irrigation Co. executed one of these agreements, but after the project had been approved and the Reclamation Service had expended several millions of dollars in its development the company raised the claim that a mistake had been made in defining its rights, and that it was entitled to a larger amount of water than that named in the agreement. This claim resulted in a suit, which was brought June 25, 1912. The trial court decided in favor of the Government (230 Fed., 284), and the irrigation company took an appeal to the Circuit Court of Appeals, which latter court sustained the judgment of the lower court (246 Fed., 212). Application was then made by the company to the trial court for a rehearing upon the ground of newly discovered evidence. The Government moved for a dismissal of this application, and the matter was argued before United States District Judge Rudkin at Yakima, March 23, 1920, resulting in a decision sustaining the Government's motion.

### Artificial Waters Not Subject to Appropriation.

Artificial waters are not subject to appropriation under the statutes of New Mexico. Natural waters flowing in streams and watercourses are subject to appropriation. The creator of an artificial flow of water is the owner of the water so long as it is confined to his property, but when such artificial waters are deposited into a natural stream, and the creator of the flow has lost his dominion over the same, such waters become a part of the waters of the stream, and are subject to appropriation and use; but it is only after such waters reach the stream that they are sub-

ject to appropriation and use, and the appropriator or user of such waters can acquire no right as against the creator of the flow to require him to continue supplying such waters to the stream. (*Hagerman Irr. Co. v. East Grand Plains Drainage Dist.* (N. Mex.), 187 Pac., 555.)

### Qualifications of Voters in Irrigation Districts.

Laws of Oregon, 1917, page 762, paragraph 29, relating to the issuance of bonds by an irrigation district, and allowing every owner of 1 acre of land or more to vote, is not invalid as violating Constitution, article 1, paragraph 20, and Constitution, United States, amendment 14, paragraph 1, as depriving smaller landowners of equal privileges and immunities. (*In re North Unit Irr. Dist. in Jefferson County (Oreg.)*, 187 Pac., 839.)

### Drainage Water in Irrigation Canals.

Where a drainage district organized under the statutes of New Mexico constructs a drainage system, and the drainage ditch flows into an irrigation canal, no right on the part of the irrigation canal exists to require a continuation of such flow of water. (*Hagerman Irr. Co. v. East Grand Plains Drainage Dist.* (N. Mex.), 187 Pac., 555.)

### Prescriptive Rights in Irrigation Ditch.

For defendants to acquire prescriptive rights to interests in a ditch and waters flowing therein, it is not necessary that they should pay taxes specifically assessed on the ditch and water rights, but it is enough that the interest of each in the ditch and water right had become appurtenant to his land, and that they paid all taxes levied and assessed on their lands, as such appurtenant interests must be considered as included in the assessments of the lands. (*Ayer v. Grondoni et al.* (Calif.), 187 Pac., 137.)

### Irrigation Districts in Idaho.

An irrigation district in the State of Idaho is a municipal corporation and its property is public property. (*Storey & Fawcett v. Nampa & Meridian Irrigation District*, 187 Pac., 946.)



### Use of Seepage Water in Montana.

It is established in Montana that the prior appropriator of water is entitled to the use of all the water in the stream to satisfy his appropriation, and it is immaterial whether such satisfaction is to be had out of the waters that naturally flow in the stream and its tributaries above the head of a ditch, or come from waters which run into the stream by rains, snows, springs, or seepage. The doctrine of a right of use by appropriation is inconsistent with a claim of right of ownership of seepage not held in a reservoir, and which is merely incidental to usual irrigation. (Marks v. Hilger, 262 Fed., 302.)

### Water-Right Findings of State Engineer in Nevada.

In proceedings for the determination of water rights pursuant to the water law, the ultimate findings of the State engineer are entitled to great respect, but do not take from the district court on exceptions the power to grant relief to a party whose rights may have been infringed by the engineer. (Scossa v. Church et al. (Nev.), 187 Pac., 1004.)

### Lands for Reservoir on Blackfeet Project.

AN ACT To authorize the Secretary of the Interior to acquire certain Indian lands necessary for reservoir purposes in connection with the Blackfeet Indian reclamation project. (Act Apr. 1, 1920, Public No. 168, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of the Interior is hereby authorized to expend the sum of \$5,944.93 from any money now available for construction of irrigation systems on the Blackfeet Reservation, in Montana, in the purchase of lands embraced in the allotments of George W. Cook and David La Breche, described as lots three and five, section twenty-seven, and lots one and two, section thirty-four, township thirty-two north, range thirteen west, in consideration of the relinquishment by the allottees of all their right, title, and interest in and to said lands, and of their right to select lieu land under the provisions of section 14 of the Act of June 25, 1910 (Thirty-sixth Statutes at Large, pages 855 and 859), and the release of all their claims whatsoever against the United States or the Blackfeet Tribe of Indians by reason of said lands being required for reservoir purposes in connection with the irrigation system on the aforesaid Indian reservation.

### Congressional Bills of Interest to Our Readers.

#### IN THE SENATE.

*S. 4186.*—"A bill to authorize the Broadwater Irrigation District, a Montana corporation, to construct a dam across the Missouri River." Introduced April 3, 1920, by Senator Henry L. Myers, of Montana.

*S. 4214.*—"A bill to authorize the Secretary of the Interior to issue patent in fee simple to the Uni-

versity of Arizona, State of Arizona, of Tucson, Arizona, for a certain described tract of land." Introduced April 13, 1920, by Senator Marcus Smith, of Arizona. The land described is in the Yuma irrigation project.

*H. R. 12537.*—"An act to provide for an examination and report on the condition and possible irrigation development of the Imperial Valley in California." Passed the House of Representatives March 15, 1920, and is now being considered in the Senate.

#### IN THE HOUSE.

*H. R. 13293.*—"A bill to be known as the national soldiers' land settlement, home aid, vocational training, and adjusted compensation act, and to provide land-settlement aid or home aid or vocational training, or adjusted compensation to those who have served in the military or naval forces of the United States during the war between the United States and the Central Powers between April 6, 1917, and November 11, 1918, and have been honorably separated or discharged therefrom or placed in the Regular Army Reserve, or are still in the military or naval service; and to provide land-settlement aid for citizens of the United States who served in the army or navy of our Allies in the war against the Central Powers between August 4, 1914, and November 11, 1918, and who have received an honorable discharge or its equivalent." Introduced March 26, 1920, by Representative Joseph W. Fordney, of Michigan, on the request of the legislative committee of the American Legion.

*H. R. 13501.*—"A bill to provide for the sale of public lands to members of the military and naval forces." Introduced April 8, 1920, by Representative Riley J. Wilson, of Louisiana.

*H. R. 13554.*—"A bill for the relief of the Garden City (Kansas) Water Users' Association, and for other purposes." Introduced April 9, 1920, by Representative J. N. Tincher, of Kansas.

*S. 3477.*—"An act to increase without expenditure of Federal funds the opportunities of the people to acquire rural homes, and for other purposes." Passed the Senate April 6, 1920, and is now being considered in the House.

—Will R. King.

### BEVERIDGE-CAMPBELL.

Mr. and Mrs. Samuel Reese Campbell announce the marriage of their daughter, Marguerite Etzler, and James Crombie Beveridge, jr., on Tuesday, April 27, at the First Presbyterian Church, Washington, D. C.

"Jim" Beveridge, as he is familiarly known, is one of the popular clerks in the Mails and Files Division of the Washington office, and is receiving the congratulations of his many friends. Mr. and Mrs. Beveridge will reside in Washington, D. C.

## REPAIRS TO REVETMENT, BELLE FOURCHE DAM.

By B. E. Hayden, Project Manager, Belle Fourche Project, S. Dak.

The Belle Fourche Dam is located on Owl Creek about 12 miles northeast of Bellefourche, S. Dak. It is an earthen structure 6,200 feet long on top and 122 feet high above the cutoff trench at maximum section. The dam has a front slope between the high-water line, elevation 2975, and the footing for the concrete paving, elevation 2920, of 2 to 1. From high-water line to the parapet wall at the top of the dam, elevation 2990, the slope is  $1\frac{1}{2}$  to 1. The whole face of the dam is paved with concrete blocks as a protection against erosion from wave action. The axis of the dam is from southwest to northeast, thus giving a facing toward the northwest, the direc-

narrow gauge railway built for that purpose. The foundation for the revetment consists of a 2-foot layer of gravel, the top foot of which is screened and the lower foot pit run carrying an excess of sand. From about elevation 2977 to the top of the dam the bed is only 1 foot thick and consists of screened gravel. Blocks were laid with close-fitting joints although not pointed. Horizontal joints were continuous; vertical joints were broken.

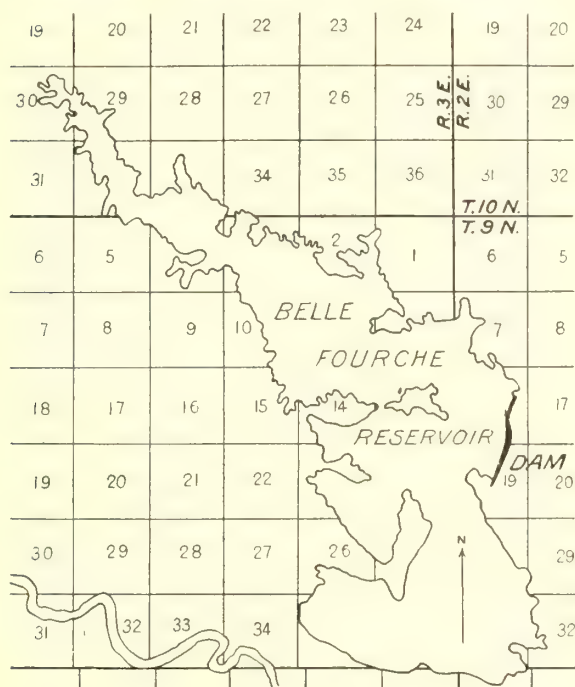
On April 14, 1912, a characteristic seasonal storm occurred, lasting for several hours, with what was estimated to be a 60-mile wind from the northwest, driving squarely against the face of the dam. When the storm had subsided so that an examination could be made it was found that 230 blocks were dislodged and breaches made in the pavement at various points between stations 29 and 42. The water surface at the time of the storm stood at elevation 2959, or 16 feet below capacity.

Briefly, the method of repair followed was to refill the breaches with gravel, relay the disturbed blocks 6 to 8 inches below grade, and finish with a continuous layer of concrete to grade. The concrete was reinforced and anchored to the blocks below.

It was decided that all blocks in the "danger zone," (thirteenth to twenty-fifth course—there are 29 courses in all) should be secured by filling all horizontal joints with grout and by drilling  $1\frac{1}{2}$ -foot holes at the lower corners of each block and filling these also with grout, on the theory that the mortar would work down into the underlying gravel and form a lug below the block.

Subsequent examination proved that the work as outlined was never accomplished, as in most instances the grout did not penetrate the full thickness of the blocks either at the joints or in the keys at the corners. Very few cases were found where a lug was formed at the bottom of the key below the blocks.

Minor disturbances occurred subsequent to the 1912 storm, but no serious trouble was experienced until May 10, 1916, when a windstorm of considerable violence, lasting for more than 24 hours, resulted in the displacement of 366 blocks in the revetment between stations 12 and 44, and in slight disturbances at a number of other points. The maximum wind velocity noted for a short period during this storm was 60 miles per hour, resulting in waves approximately 5 feet from trough to crest, or about the same as in 1912. Spray from the waves rushing up the slope was carried in sufficient quantities by the wind to thoroughly drench a pedestrian walking along the top of the dam. The direction of the wind was northwest, or normal to the axis of the dam.



tion from which all severe wind storms originate in this section of the State.

Original construction was begun early in 1906 and was completed 5 years later, in March, 1911.

The revetment on the face of the dam as originally constructed consisted of concrete blocks  $6\frac{1}{2}$  feet by 5 feet and 8 inches deep, laid on the 2 to 1 slope, and blocks of the same size but 6 inches deep laid on the  $1\frac{1}{2}$  to 1 slope. At the bottom of the slope the revetment is supported by a footing of wooden piles and a concrete wall. A parapet wall 2 feet high runs along the top of the revetment. The blocks were cast at the Snoma gravel pit  $6\frac{1}{2}$  miles away on the river bank and were transported to the dam on a



A peculiar condition noticed in both the 1912 and 1916 storms was the spurting of water from the joints at and just above the water line upon recession of the waves. The maximum length of jet noted was approximately 18 inches, normal to the surface of the pavement. This would seem to indicate that during the period of recession of the waves a considerable superelevation of water existed behind the blocks at the water line. The height of this superelevation and the forces resulting therefrom evidently overcame the weight and frictional resistance of the blocks and gradually lifted them from their bed.

Temporary repairs to these breaches were immediately put under way with a force of about 40 men, transferred from a near-by construction camp, and were completed on June 28.

After studying the effects of the storm and considering various plans suggested to make the revetment permanently safe against damage from wave action, and in view of available equipment and experiments previously conducted, the following plan of repair was adopted:

1. To chisel or V out all joints between the thirteenth and the eighteenth courses to a depth of about 5 inches and refill with a good grade of cement mortar.

2. To relay all blocks from the eighteenth course to the top of the dam, placing the blocks with long dimensions up and down slope, breaking horizontal joints and leaving vertical joints continuous; blocks to be placed on undisturbed gravel where possible and great care to be exercised in keeping the surface of the gravel bed uniform.

3. To fill all breaches with unscreened gravel well rammed and puddled.

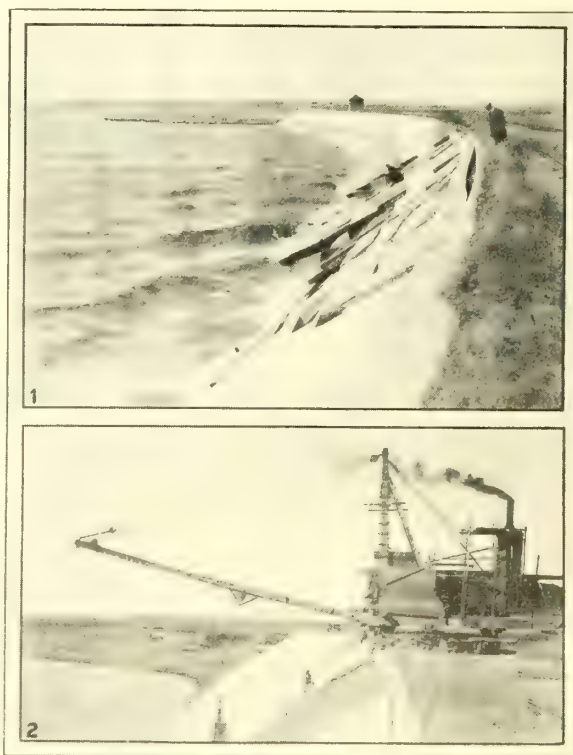
4. To lay all blocks with open joints 1 to 2 inches wide and to fill the joints with a good grade of cement mortar.

The work of relaying the upper course of blocks was commenced September 2, 1916, under the direction of R. V. Sass, superintendent of construction, and the blocks were handled by a 50-foot boom revolving derrick formerly used for drainage work on the Minidoka project, Idaho. The blocks were removed in such a way as to form a V shaped opening in the revetment. The derrick moved along the top of the dam picking up blocks in front and relaying them behind.

The work was carried on in eight-hour shifts with nine men comprising a crew as follows: One shift boss, one crane or derrick man, one swing man, and six laborers. Two laborers on the slope in front lifted the blocks and fastened the dogs, and four at the rear smoothed the surface of the gravel and slid the blocks into place. Pieces of wood  $1\frac{1}{2}$  by  $1\frac{1}{2}$  by 4 inches were used to separate the blocks until they were grouted in. On September 11 the second shift was put on and a little later the third. All three shifts were used until the work was nearly completed.

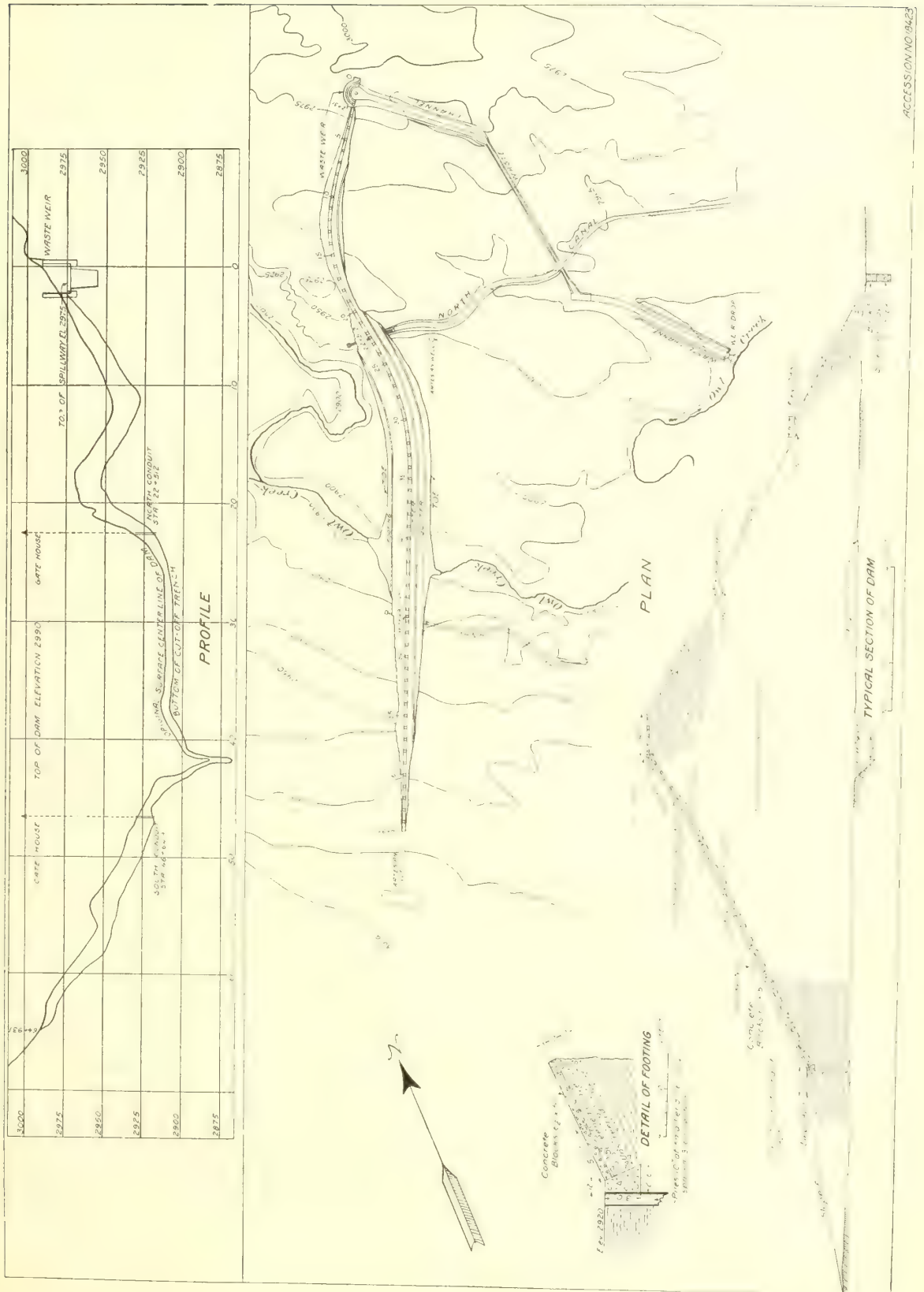
Work was started at Station 12 and carried southward to the large break at Station 59+40 near the south end of the dam and the relaying carried northward. This was done to allow time for filling in the breaches with gravel and to get behind the V-ing outfit. The cement-block gate houses at the north and south conduits were partially removed to make room for the derrick to pass.

V-ing of the joints was begun on September 19 at Station 53+00 and was carried back to Station 4 except between Stations 14 and 21, where a projection of high land protects the pavement. Back of Station 4 the pavement is not affected by wave action, as it is protected by a bending of the shore line.



1. BLOCKS DISPLACED BY WAVE ACTION. 2. DERRICK RELAYING BLOCKS

The blocks between Stations 4 and 12 were not relaid, but all joints in this section were V-ed to the top of the dam. The compressor and dinkey used in connection with chiseling out joints were passed around the derrick by means of a temporary trestle. Wagons loaded with gravel for the cement work were swung around the derrick by means of the boom. The chiseling was done with Sullivan and Ingersoll-Rand hand air drills. Four drills were used at first, but later five were operated almost continuously with three shifts of eight-hours each. The steel used had a wedge-shaped point slightly bent. Joints were opened





to a depth of 5 inches. The air was furnished by a 153 cubic feet per minute, capacity 30-horsepower compressor, mounted on a flat car and transported on a 3-foot gage track previously laid along the top of the dam. Power was furnished by an old 18-ton Davenport dinkey locomotive—a left over from construction days. By this arrangement it was possible to move the compressor without delaying the work. A vertical-type boiler was ordered to run the compressor, but was late in arriving, and the dinkey had proved so satisfactory for this work that the boiler was used for pumping water for the concrete work.

Grouting of joints was commenced October 12. The mixing was done with a Ransome Bantam mixer operated by gasoline power. Lack of pumping facilities for washing out the joints delayed this work, and a 5 by 5 inch pump direct connected with a 4-horsepower Novo gasoline engine was installed for this purpose. Water was pumped from the reservoir.

Grout was made with 1 part cement to 3 parts sand, passing a one-half inch mesh screen. For the larger joints a coarser gravel was used in order to get more strength of concrete. The mixture was made quite sloppy and dumped directly onto the pavement at the upper end of the vertical joints. It was then worked down the slope and into the openings. No difficulty was experienced in getting the mortar well into the joints and the gravel bed below.

All blocks were thoroughly wetted and all V-ed joints carefully cleaned before grouting was done. Two shifts of eight hours each were used on this work most of the time. Three shifts were used for a short time only. Each shift comprised about 15 men. L. A. McConnell was in charge of this feature of the work.

Water from the artesian well near the south end of the dam was conducted along the top of the dam in a 2-inch pipe and furnished the principal supply for the boilers and a part of the time for the mixer as well.

Light was supplied from eight Milburn acetylene lamps.

All supplies were hauled with teams from Fruitdale, S. Dak., on the Chicago & North Western Railroad, 6 miles distant. The gravel was hauled by teams from the Suoma pit, a distance of 6½ miles. The average force when in full operation was about 90 men.

The maximum number of linear feet V-ed per shift of eight hours was 498, and the average per shift was 372. The total number of linear feet of joint V-ed was 49,913.

The maximum number of blocks relaid per shift of eight hours was 130, and the average number per shift was 57. The total number of blocks relaid was 6,466.

On November 15 the mercury dropped to  $-15^{\circ}$  F. after a 5-inch snowfall. The weather was too cold for

mixing concrete for three days, and it was impossible to do any work with the air drills. It was feared at one time that all operations would have to be closed down, but the men were comfortably housed and well fed and enough remained to resume work a few days later when the storm blew over. A small amount of concrete was frozen on the surface, giving it a bad appearance, but no material damage was done.

With comparatively few exceptions the paving blocks were of good quality and were not injured by rehandling. Over a small area, however, well toward the south end of the dam a rather large percentage of blocks broke while being tipped up for grappling. In a small percentage of instances the grouting and keying previously done offered some resistance to the removal of blocks.

In one place a pocket with an area equal to four or five blocks was found where the gravel had settled away from the pavement at least 1 foot and the blocks were held up by being slightly arched and tightly wedged together. Slight settlement was noticed in a number of other places, but of so little extent that it probably had little effect, on the pavement. In general the bedding of the blocks was excellent, and whatever settlement had taken place in the dam itself had been followed by a corresponding adjustment of the gravel and paving.

When the work was completed the whole face of the dam took on the appearance of one continuous monolithic slab of concrete. The work was so well done that after a year's time with temperatures from  $-30^{\circ}$  to  $110^{\circ}$  F. there was nothing more than hairline cracks anywhere to be seen in the pavement, and now at the close of the third season there is still not the slightest suggestion of failure or defect, notwithstanding the fact that during these three years the reservoir has been filled to the spillway crest and the heaviest storm to visit this section of the State since the construction of the dam has been experienced with wind velocities as high as 72 miles per hour.

### DWIGHT E. MARTIN, 1851-1920.

Word has been received of the sudden death from heart failure of Dwight E. Martin, on April 7, at Ysleta, Tex.

Mr. Martin was a construction foreman on the Rio Grande project. During the past 12 years he had been employed on the Yakima, Umatilla, Klamath, Shoshone, and Rio Grande projects, and had also been engaged in irrigation work in Porto Rico.

Mr. Martin was a loyal and capable employee whose services on our projects were highly appreciated by his associates. He was a Mason and a member of the American Association of Engineers. He was buried at Parishville, N. Y., and leaves a widow and a daughter.

## INSPECTION OF DRAIN TILE FOR THE U. S. RECLAMATION SERVICE.

By Walter L. Drager, Assistant Engineer, Denver Office.

In the construction of tile drains it is of the utmost importance that the strength of tile be sufficient to carry the superimposed load of earth with a good margin of safety. The bad effect on the land from impaired drainage may be very serious and the cost of removing and replacing broken tile amounts to many times the cost of the tile itself. Moreover, a broken tile will allow the back-filled material to wash into the tile line and clog up a section of good tile, which must then also be removed, cleaned out, and relaid. The expense of doing this is obviously much greater than the cost of original construction of the equivalent length of drain. For these reasons all drain tile should be accepted only after a thorough test has been made of its crushing strength, and rigid inspection should be made at the time of shipment and again immediately before placing in the trench. The cost of such inspection is of minor importance compared with the beneficial results accruing therefrom.

All drain tile purchased by the United States Reclamation Service is tested prior to shipment. The results obtained from over 1,000 samples broken have been assembled in various ways and studied in an endeavor to determine the effect of the thickness of tile upon its crushing strength. It has been found, however, that no relationship could be determined from these results, as the products of different factories show a wide variation in crushing strength, dependent principally upon the grade of clay used in the manufacture and the methods of burning. This condition exists even among samples tested from the same factory where all the tile of one size are pressed through the same die, and yet the products of different kilns show considerable inconsistency in the variation in both thickness and breaking strength. Such a condition is illustrated by the following table, the samples representing the output of one factory during January and February, 1918:

Number of pieces.	Size of tile.	Thickness.	Mean breaking strength.
	<i>Inches.</i>	<i>Inch.</i>	<i>Pounds per cubic foot.</i>
18	12	$\frac{1}{16}$	2,221
29	12	$\frac{1}{16}$	2,058
6	12	$\frac{1}{16}$	1,806
10	15	$\frac{1}{16}$	2,132
79	15	$\frac{1}{16}$	2,272
5	15	1	2,037

The true relation between thickness of tile and crushing strength might be determined by making a large number of tests of samples made with different sizes of dies, and at the same plant. It is doubtful, however, if such information would be of any value, as the above results indicate that the most satisfactory method of determining the crushing strength of a

class of tile is to test the samples, and the principal requirement of the project is that tile shall be of sufficient strength to withstand earth pressures and not fail in the trench.

A number of absorption tests were made at Pittsburg, Kans., by the Reclamation Service in 1917 in order to determine an approximate relationship between absorption and crushing strength. After testing for crushing strength, the four principal pieces of each sample were weighed, immersed in cold water for 24 hours, and weighed again. The results of this test were fairly consistent, and indicated that the maximum absorption allowable in the product manufactured from that particular grade of clay is about 4 per cent. This conclusion, however, would not necessarily be applicable to the product of another plant using a different clay.

The specifications under which the Reclamation Service purchases drain tile are based upon past experience and tests made by various agencies. The principal physical requirement is crushing strength. No limit is specified for either absorption or thickness of shell, and glaze is of minor importance. This has the advantage of allowing any contractor having a better grade of clay and a good process of burning to decrease the weight of material used, and at the same time a saving to the Government in freight charges may be effected. The following excerpts from the specifications include the principal requirements:

Each tile shall be of cylindrical section, the size being designated by the interior diameter. The average diameter shall not be more than 3 per cent less than the specified diameter. The maximum and minimum diameters of the same tile and the average diameters of tiles intended to be used adjacent to each other, shall not differ more than 80 per cent of the thickness of the wall. Tile shall be 2 feet in length. Tile designated to be straight shall not deviate materially from a straight line, and the ends shall be practically at right angles to the center line. Tile shall be reasonably smooth on the inside and free from cracks and checks, extending into the body of the tile in such a manner as to appreciably decrease the strength. Tile stood on end and tapped with a light hammer, when dry, shall give a clear ring. Tile shall be free from chips and broken pieces that will decrease its strength or admit earth in the drain. The ends shall be regular and smooth and admit of the making of a close joint when properly turned and pressed together.

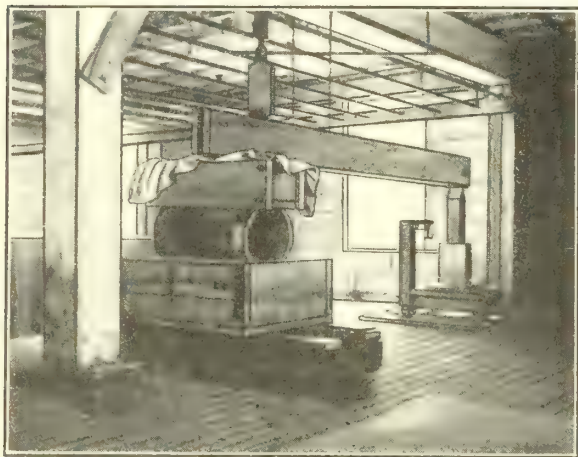
Tile shall be partially salt-glazed, and be burnt to sufficient temperature to vitrify the material and produce strong dense walls.

Tile shall have minimum and average supporting strengths, when tested by the method herein described, not less than the following, in pounds per linear foot:

Size of tile.	Minimum.	Average.
<i>Inches.</i>		
8	1,140	1,200
10	1,425	1,500
12	1,710	1,800
15	1,900	2,000
18	2,185	2,300
20	2,470	2,400



In making tests of drain tile, the United States Reclamation Service has adopted the method used by the Iowa State College of Agriculture. The testing machine shown in the accompanying sketch and photograph consists of a simple beam, a pair of scales, and a jack so placed that the load applied will



DRAIN TILE BEING TESTED.

be proportionately distributed between the scales and the sample to be tested.

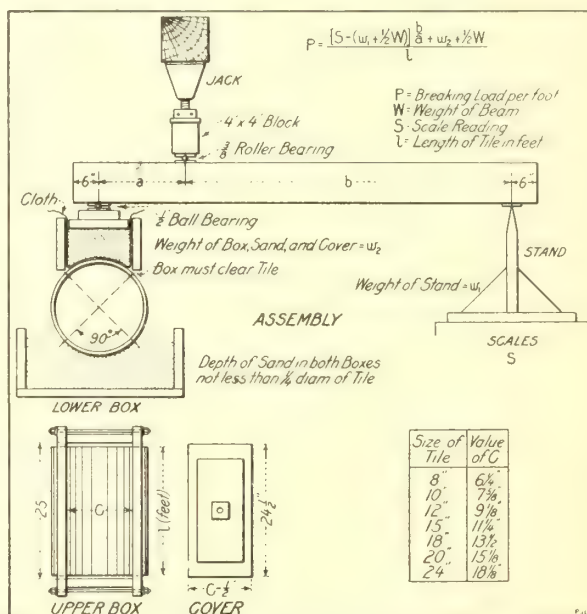
The sample tile, after weighing and measuring, is embedded in sand in the lower box to one-quarter of its circumference. Then the upper box is set in position, lined with cloth, filled with sand, and the cover adjusted. Each part of the apparatus is carefully leveled when placed in position and the sand thoroughly spaded to provide uniform pressure on the tile. The beam is placed in position, resting on a one-half inch steel ball in the exact center of the cover; the other end of the beam is supported on a knife-edge stand on the scales adjusted to correct height to make the beam level. The jack is then clamped down tight upon the roller bearing on the top of the beam in the position shown. Before any additional pressure is applied the upper box must be raised about one-fourth inch or merely enough to clear the tile. The jack is then turned slowly, gradually increasing the pressure on the tile until the breaking point is reached, the proportionate amount of the applied load being measured on the scales. All sand used in making the test must be clean, coarse sand, about No. 8 to No. 20 in size, and thoroughly dry.

In choosing samples for testing from a miscellaneous pile, care is taken to select specimens which are sound and which are representative of the various classes of tile in the stack. Soft burned tile and other tile which are obviously unsuitable are not tested and are, of course, rejected at the time of loading inspection. When tile to be tested is still in the kiln, samples are taken from each tier in height, and it

has frequently been found that in some kilns the bottom tier of pipe failed, due to insufficient burning, and the balance of material in the kiln passed the test with a good average. On the other hand, it has occasionally been found that the top tier has failed, due to overburning, while the lower tiers were good pipe. In either case it would obviously be unfair to reject the whole kiln, and for this reason each tier has been taken as a class by itself in testing a kiln.

The method of loading inspection varies to suit the convenience of the contractor, and the relative location of car and tile to be shipped. The most satisfactory method is for the inspector to stand at the car door and sound the tile with a hammer as it rolls into the car on a plank. At the same time the inspector is easily able to detect the out-of-shape pieces. This is hardly practicable, however, where the storage pile is a considerable distance from the car as it requires the contractor to haul all the rejected pieces to the car. In such case it is customary to make the inspection at the storage pile where the tile are being loaded on wagons or wheelbarrows.

As the Reclamation Service specification provides that only sound tile shall be accepted, inspection is a comparatively simple matter, as every tile must give a clear ring when struck with a hammer. This is a



DRAIN TILE TESTING MACHINE.

very positive test, and any piece having a doubtful ring is, nine times out of ten, not a sound pipe. "When in doubt, throw it out," is a very safe maxim to follow in drain-tile inspection, and although the inspector who keeps in mind the serious consequences resulting from a failure of tile in the trench may oc-

asionally reject a sound tile, he need have little trouble with his conscience on that account.

The accompanying table shows a summary of the results of over 800 tests made at various plants:

*Summary of tests of tile made at various plants.*

Size of tile and location of plant.	Number of samples tested.	Breaking strength per foot.		
		Maximum.	Minimum.	Average.
8-inch tile:				
Pittsburg, Kans.....	9	2,285	1,415	1,942
10-inch tile:				
Denver, Colo.....	15	1,606	1,139	1,355
Des Moines, Iowa.....	29	2,984	1,295	2,223
Pittsburg, Kans.....	159	2,939	776	1,765
Deepwater, Mo.....	31	2,773	1,701	1,993
Hopkins, Minn.....	31	1,606	1,000	1,301
12-inch tile:				
Denver, Colo.....	15	2,280	1,163	1,583
Des Moines, Iowa.....	2	2,152	2,102	2,127
Pittsburg, Kans.....	245	2,861	1,154	1,962
Deepwater, Mo.....	47	2,850	1,102	2,107
15-inch tile:				
Denver, Colo.....	20	2,155	1,066	1,529
Los Nietos, Calif.....	4	1,696	1,387	1,532
Pittsburg, Kans.....	89	3,366	823	2,113
Deepwater, Mo.....	98	2,808	1,480	2,247
18-inch tile:				
Denver, Colo.....	5	1,685	1,418	1,577
Los Nietos, Calif.....	5	1,548	1,171	1,332
Pittsburg, Kans.....	8	3,186	2,202	2,652
20-inch tile:				
Los Nietos, Calif.....	5	1,942	1,459	1,625

### DENMARK'S AGRICULTURAL STRENGTH.<sup>1</sup>

Denmark is one of the most highly developed food-producing countries in the world. Nearly two-thirds of the land is under intensive cultivation, the farms averaging about 35 acres each.

Before the war Denmark produced more dairy cattle in proportion to population than any country in Europe, and twice as many to the square mile as the leading cattle States of America. The reduction necessitated by war conditions was scientifically carried on, great care being taken to retain the best animals. In 1914 Denmark was the largest exporter of butter in the world, the annual production of 1,503 dairies being 128,742 tons of butter and 17,123 tons of cheese. Due to scientific methods of feeding, the average yield of milk per cow was 6,400 pounds as compared with 3,700 pounds in the United States. Products are adapted to the requirements of consumers, the quality being guaranteed by means of a numbering system of trade-marks under which even individual eggs are marked, thus definitely fixing the responsibility on the actual producer.

During the last few years the farmers have directed their efforts to the extension of the already well-developed seed industry, and to the production of beets and other root crops for fodder. Potatoes and sugar beets, which are becoming increasingly important

in the foreign trade of the country, in 1919 represented a substantial part of the total value of the harvest. Rationing of certain commodities has been adopted in order to increase exports.

Denmark owes her prominent position chiefly to the cooperative system, by means of which agriculture has been developed along organized lines. Prior to such organization the country's food products consisted mainly of wheat and grain, butter being exported almost entirely from dairies on a few large estates. Farmers were unable, by individual effort, to produce sufficient quantities for any large amount of export; the quality of the products varied greatly, and responsibility could not be fixed on the actual producer.

By organized effort the small farmers constructed a dairy to which each was under contract to deliver all the milk from his cows and was held responsible for the milk furnished by him. Profits were disbursed to members in proportion to the amount of milk supplied. Other societies for various purposes were similarly developed and the system rapidly gained favor throughout the country. The export food products increased from \$53,716,900 in 1895 to \$148,442,520 in 1913, during which time the country changed from a grain-exporting to a grain-importing nation. The cooperative idea has been applied not only to all branches of agriculture but also for exports and imports. Recently the separate societies have been coordinated by means of a central cooperative committee, which has general supervision over the entire country. The small landowner has been particularly helped by the system. Each member, regardless of the size of his holdings, receives his proportionate share of the profits and has an equal voice in the management of the societies. This puts him in a position where he may obtain credit for extensions and improvements. In the cooperative societies Denmark appears to have found a strong assurance against bolshevism.

### HENRY FOSTER NEWELL, 1882-1920.

Henry Foster Newell, for eight years in the engineering force of the Panama Canal Commission, died at Ancon on April 5 of influenza-pneumonia. He was born on January 17, 1882, at Bradford, Pa.

Mr. Newell was for some years engaged in surveying and general engineering work in the western arid States. His principal work was in connection with exploration and detailed mapping of the tributaries of Chagres River and the location of works for the defense of the Panama Canal. He served in a machine gun company on the Mexican border. He was a brother of F. H. Newell, former chief engineer and director of the United States Reclamation Service, and now professor of civil engineering at the University of Illinois.

<sup>1</sup> Extracts from pamphlet issued by Brown Bros. & Co., New York.



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

### SUBSCRIPTION BLANK.

#### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

\_\_\_\_\_, 1920.

CHIEF CLERK,

U. S. Reclamation Service,

Washington, D. C.

DEAR SIR: I am *not* a water user on one of the projects of the U. S. Reclamation Service, but wish to receive the RECLAMATION RECORD each month.

I inclose herewith 50 cents for a year's subscription, beginning with the current issue.

\_\_\_\_\_  
(Name.)

\_\_\_\_\_  
(Street number.)

\_\_\_\_\_  
(City and State.)

(Write Plainly.)

**NOTE.**—Mail the above blank **TO-DAY**. Send money order or New York draft, made payable to Special Fiscal Agent, U. S. Reclamation Service. Do NOT send stamps.

Inclosed I am sending money order for 50 cents. This is gratifying to know that your magazine has a prospect of continuing as it is a most welcome little news letter to me and I am sure to all who are fortunate to know of it.—W. E. Egerton, Remount Depot, Fort Bliss, Ter.

### YUMA PROJECT AND YUMA MESA.

YUMA, ARIZ., April 10, 1920.

DR. HUGH A. BROWN,

*Editor Reclamation Record.*

MY DEAR DOCTOR: From time to time unit holders on Reclamation projects throughout the United States write me for information about Yuma project, but more particularly about "my beloved Yuma mesa." It has become quite a task to answer all these inquiries, though it is a great pleasure at all times to do so when I can find the time. Thinking a letter from me to you on this subject may prove worthy of publication, I am taking the liberty of sending you this communication, which will not only serve as answer to those inquiries yet unanswered but will anticipate other inquiries.

The Yuma County Commercial Club is just going to press with its annual booklet, publication of which has been deferred until now awaiting the outcome of the public sale of lands in unit B of the Yuma mesa, as well as final determination of what is to be done with the privately owned lands in unit A of the Yuma mesa. In giving a brief résumé of the contents of this forthcoming booklet I will at once be giving good reading matter and at the same time be answering many of the questions that are asked me from every part of the country.

Work on Yuma project was begun in 1905.

The Laguna Diversion Dam was completed in 1910.

Water for irrigation purposes was first turned into the siphon in June, 1912.

The value of the crops in 1912, harvested from 11,060 acres, was \$497,000.

The value of the crops in 1919, harvested from 50,000 acres, was \$7,500,000.

The total value of the crops harvested on Yuma project, beginning with 1912 and ending with 1919, was \$20,473,563.

The construction cost of Yuma project, and all moneys expended up to and including December, 1919, amounted to \$9,000,000.

This shows that in less than seven years the Yuma project has paid for itself twice over, with upward of \$2,000,000 to spare.

The crop value per acre of lands harvested in the five great Middle Western States, Iowa, Nebraska, Kansas, Illinois, and Missouri, for the year 1918 (the last official data obtainable) was \$26.26; for the same year the crop value per acre on Yuma project was \$113.32.

For the year 1919 the crop value per acre for Yuma project was close to \$150 per acre, probably leading all other sections in the United States by a very wide margin.

Under direction of former Secretary of the Interior Franklin K. Lane, 6,400 acres of lands on the Yuma

mesa were designated as unit B, and by his order offered for sale at public auction on December 10, 1919.

About 5,000 acres were disposed of within 12 hours of actual selling time at an average of \$230 per acre, \$200 per acre of which automatically went with the bid as construction costs of the works necessary to reclaim these unsurpassed lands.

By further order of Secretary Lane the unsold portion of this tract was authorized to be sold by means of "sealed bids," these bids to be opened every Tuesday at 2 o'clock in the afternoon. By this method about 1,000 additional acres have been sold, leaving a few hundred acres yet available for purchase by means of sealed bids.

There is now ample money in the special fund to guarantee the construction costs of the irrigation project, and it is confidently expected that contracts will be let for the canal excavation by not later than the 1st of July, and that all the main canals and laterals will have been completed by early next spring.

The private owners of lands located in unit A have organized an irrigation district and by the time work begins on unit B it is expected bonds will have been issued and the necessary money raised so the United States Reclamation Service can construct both units at the same time, thus reclaiming from the desert about 12,000 acres of the very choicest citrus-fruit lands on the face of the earth, destined in the very near future to make Yuma the most famous winter resort in the United States, for much of the Yuma mesa land that has been sold has been purchased by wealthy people of the Eastern and Middle Western States, who have declared that as soon as irrigation water is available they will plant citrus fruit on their holdings and make Yuma their home during the winter months.

These lands on the Yuma mesa have long been characterized by scientific citrus-fruit growers as immune from killing frosts, making them the most desirable citrus-fruit lands in the United States.

Without any kiddin', Yuma is the richest section of our glorious country, there being a greater per capita wealth here than in any other agricultural community in the United States. For nine months in the year our climate is simply perfect, the best of which there is any authentic record, while the other three months are just warm enough to make the alfalfa grow by leaps and bounds, it rarely ever being cold enough to wear an overcoat in the good old summer time.

The people of Yuma are immensely pleased over the fact that "my beloved Yuma mesa" is so soon to blossom like the proverbial rose in the springtime. We have waited, lo, these many years for this great boon, and now that it is almost in sight I can not refrain from expressing my sincere gratitude to Secretary Lane and Director Davis, to Judge King, Statistician Blanchard, and your own good self for the many kindnesses done me in my personal appeals to bring about this happy ending of the long-draw-out fight.

## BURIED TREASURE.

Buried treasure always has been a phrase to conjure with in America, but those who have become rich by finding it are almost unknown. Many a farmer whose plow point has turned up an old coin has dropped the handles of his plow and left his fields unplanted while he dug unprofitable holes for buried silver. The wealth was under the plowpoint, but it was not in the form of pieces of eight, but lay in the cultivation of the soil itself.

The whole coast of the United States from Block Island to Sabine Pass on the Gulf of Mexico has been dug over by treasure seekers hunting the buried loot of Capt. Kidd and Lafitte, but the only discovery thoroughly authenticated was that made near Montauk Point, Long Island, where a part of the wealth taken by Kidd from the *Quedagh Merchant*, a treasure ship, was found. That money went into the treasury of the colony of New York.

When you sell or trade your Liberty bonds and war-savings stamps for get-rich-quick stocks, you are hunting buried treasure and you have just about as much chance to get rich at it as those people who have dug up the Atlantic sand dunes along the coast.

Around these offerings, as around pirate treasure, a cloak of mystery is thrown. Pieces of eight have an enticing, mysterious sound, but there is no mystery about pirate treasure. Pieces of eight were just plain, common, ordinary Spanish dollars, made up of eight reales or bits. Like our own dollars, they were compiled by adding one bit, or twelve and a half cents, to another to form two bits, or a quarter, and adding two quarters to form four bits, or a half dollar, which, placed together, made pieces of eight. They did not become pirate treasure until pirates had taken it by trickery or force from those who earned and saved it.

Your dollars, earned by hard labor and saved through care and self-sacrifice, will be changed into pirate gold if you sell or trade your money or Government securities for wildcat stocks. But the promoters and salesmen, who are as truly pirates as any who scuttled a ship, will get the treasure, not you. You will never get rich hunting for their hoards. You can both find and keep your treasure by putting the results of your labor in safe, sound Government securities.

—BUY W. S. S.—

It is unnecessary to say that we extend a hearty welcome to all who will cast their lot in this favored spot. It is natural for one to praise his home town, but in this instance all the praise I could personally bestow on "my beloved Yuma mesa" would do it but scant justice. It is simply the best thing out of doors.

Cordially, yours,

B. F. FLY.



## MONTHLY PROGRESS REPORTS FOR MARCH.

Monthly conditions of principal Reclamation Service reservoirs for March, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>2</sup>	Lowest gate sill. <sup>3</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River...	Roosevelt <sup>4</sup> .....	<sup>5</sup> 1,305,000	2128	1903	1,414,646	1,404,232	1,414,646	.....	2130.79	2130.18	2130.79
California, Orland.....	East Park.....	51,000	1199.68	1111.68	5,810	10,610	10,610	.....	1157.65	1166.43	1166.43
Idaho:											
Boise.....	Arrowrock.....	289,000	3211	3018	31,540	40,080	41,430	62,294	3075.5	3086.2	3087.7
	Pelee Flat.....	177,000	2518	2488	98,867	144,384	144,384	.....	2521.3	2526.95	2526.95
Minidoka.....	Lake Walcott.....	53,500	4245	4240	40,990	48,940	52,200	3,260	4243.77	4244.46	4244.74
	Jackson Lake.....	847,000	6763	6730	128,760	156,320	156,320	.....	6737.2	6738.65	6738.65
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	20,650	22,900	22,900	.....	2209.85	2210.6	2210.6
St. Mary Storage.....	Sherburne.....	33,000	4765	4720	.....	.....	.....	.....	.....	.....	.....
Sun River.....	Willow Creek.....	16,700	4130	4085	2,768	3,734	3,734	.....	4107.7	4110.8	4110.8
Nebraska-Wyoming, North Platte.	Pathfinder.....	1,070,000	5852	5670	276,630	346,600	346,600	920	5794.42	5802.82	5802.82
	Lake Alice.....	11,400	4182	4159	5,453	4,794	5,453	.....	4173.1	4171.9	4173.1
	Lake Minatare.....	67,000	4125	4074	56,103	55,065	56,103	.....	4122.8	4122.3	4122.8
Nevada, Newlands.....	Lake Tahoe.....	<sup>6</sup> 120,000	<sup>6</sup> 6230	<sup>7</sup> 6224	.....	.....	.....	.....	6225	6225.11	6225.13
	Lahontan.....	290,000	4162	4060	188,800	211,300	211,300	.....	4152	4155	4155
New Mexico:											
Carlsbad.....	McMillan.....	45,000	3267.7	3241.6	45,000	42,500	45,000	10,000	3267.7	3267.3	3267.7
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4231.5	1,120,318	1,119,057	1,123,260	59,561	4357.96	4357.9	4358.1
Oregon, Umatilla.....	Cold Springs.....	30,000	621.5	560	24,050	36,900	36,900	.....	601.13	612.18	612.18
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	305,400	310,000	310,000	225	4533.8	4534	4534
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	123,950	154,800	154,800	.....	2963.7	2968.4	2968.4
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	172,000	176,000	176,000	.....	7547.2	7547.7	7558
Washington:											
Okanogan.....	Conconully.....	13,000	2287	2232	1,004	1,813	1,813	.....	2253	2254	2254
Yakima.....	Bumping Lake.....	34,000	3426	3389	26,865	23,345	26,865	3,520	3420.5	3417.4	3420.5
	Lake Clealum.....	22,800	2134	2122	25,150	26,520	26,520	920	2134.5	2135.1	2135.1
	Lake Kachess.....	210,000	2258	2192	159,340	172,565	172,565	.....	2243.4	2246.7	2246.7
	Lake Keechelus.....	152,000	2515	2425	85,310	97,690	97,690	.....	2484.4	2490.8	2490.8
Wyoming, Shoshone.....	Shoshone.....	456,600	5360	5132.3	286,008	268,404	286,008	35,786	5330.2	5326.5	5330.2

<sup>2</sup> Or maximum storage.<sup>3</sup> Or zero storage.<sup>4</sup> Zero water depth at elevation 1902.2.<sup>5</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>6</sup> U. S. storage begins at elevation 6229.<sup>7</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—

Water was run in all of the canals during March with the exception of the Consolidated Canal. During the severe storms the latter part of February a portion of the Consolidated Canal was washed out, and therefore water could not be run in this canal until repairs were completed. This work was done as soon as possible and water was run on March 31.

During the month part of the maintenance department was engaged in replacing the washed-out portion of the Consolidated Canal by a new section, paralleling and from 100 feet to 200 feet distant from the old location. This called for the construction of about 3,000 feet of canal, 30-foot bottom, averaging 11 feet in depth, through cemented boulders, involving the moving of approximately 60,000 cubic yards of very difficult material.

Five maintenance crews were in the field during the month, and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 311; average head of stock, 62; miles main canals cleaned, 8; miles laterals cleaned, 134½; number of new structures installed, 27; number of old structures repaired, 123; riprap placed, 1,675 feet; concrete placed, 6½ cubic yards; dry masonry placed, 3½ cubic yards; concrete pipe laid, 290 feet; dirt fill placed, 27,215 cubic yards; new laterals constructed, 4 miles.

The Ruth excavator removed berm from the north bank of the Western Canal for a distance of 2¼ miles, moving approximately 2,082 cubic yards.

The Marion and P. & H. drag lines were engaged in building an earth tappoon across the Consolidated Canal below the intake of the new section.

*Operation of power system.*—The total power generated during the month was 6,597,600 kilowatt hours.

The Roosevelt power plant operated continuously during the month. The spillways of the dam discharged water during the entire month. The Cross Cut power plant operated continuously during the month. The South Consolidated power plant operated 26.5 per cent of the month. The plant was shut down when it was necessary to shut the water out of the canal on account of the work at the break in the Consolidated. The Arizona Falls power plant operated 77.3 per cent of the month. The Chandler power plant did not run during the month due to the impossibility of getting water through the Consolidated Canal.

All pumping plants were available for use during the month.

*Construction work, Roosevelt.*—The construction crew repaired about 7 miles of river road below Roosevelt Dam after the river flood subsided. This portion of the road is now in excellent condition. The road along the river to the power plant which was badly washed out by the flood was repaired. The concrete

flume under the road at the storehouse and barn was about 60 per cent completed.

*Office.*—The following acreages were entitled to irrigation water service on the first of the month:

	Acreage.	Number of applications.
Permanent.....	166,477.50	3,902
Normal flow.....	1,708.50	351
Temporary.....	17,328.50	361
Townsite.....	3,973.75	6
Total.....	189,488.25	4,620

—W. R. Elliott.

*Prevailing crop prices at close of March, 1920.*

Project.	Alfalfa hay, per ton.		Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at shipping point.				
Salt River.....	\$27.00	\$31.00	\$1.50	\$1.08	\$2.10	.....
Yuma.....	25.00	30.00	.....	.....	.....	.....
Orland.....	30.00	35.00	1.80	.....	2.20	.....
Grand Valley.....	30.00	35.00	1.60	1.10	1.93	\$3.00
Uncompahgre.....	12.00	.....	1.50	.90	2.00	3.00
Boise.....	20.00	26.00	1.50	1.40	2.10	3.90
King Hill.....	22.50	27.50	.....	1.16	.....	3.60
Minidoka.....	17.00	24.00	1.68	1.28	2.40	2.70
Huntley.....	23.00	30.00	.....	.....	.....	.....
Milk River.....	30.00	35.00	1.20	.85	2.56	3.90
Sun River.....	35.00	39.00	1.45	.95	2.57	3.15
Lower Yellowstone.....	30.00	.....	1.50	1.00	3.04	3.00
North Platte.....	17.00	.....	1.30	.90	2.50	2.40
Newlands.....	20.00	25.00	.....	.....	.....	.....
Carlsbad.....	.....	35.00	.....	.....	.....	.....
Rio Grande.....	.....	.....	.....	.....	.....	.....
North Dakota pumping.....	.....	.....	.....	.....	.....	.....
Umatilla.....	.....	31.00	.....	.....	.....	.....
Klamath.....	20.00	30.00	1.40	.93	1.95	.....
Belle Fourche.....	18.00	27.00	1.90	1.90	3.00	1.80
Strawberry Valley.....	.....	32.00	2.10	1.38	3.00	3.60
Okanogan.....	25.00	.....	.....	.....	.....	3.60
Yakima:	.....	.....	.....	.....	.....	.....
Sunnyside unit.....	23.00	27.00	.....	.....	.....	3.30
Tieton unit.....	23.00	27.00	.....	.....	.....	3.30
Shoshone.....	23.50	27.50	.....	1.20	2.35	2.40
Indian projects:	.....	.....	.....	.....	.....	.....
Blackfoot.....	.....	.....	.....	.....	.....	.....
Flathead.....	.....	38.00	2.10	1.12	2.65	3.00
Fort Peck.....	.....	35.00	.....	1.12	2.74	1.50
Riverton.....	20.00	.....	.....	1.86	.....	3.00

YUMA PROJECT, ARIZONA-CALIFORNIA.

March weather and labor conditions were fair.

*Construction.*—On the Yuma Valley main drain the Bucyrus dragline excavator moved 4,600 yards of material, station 912 to station 936. This point is at the upper end of the Tule Lagoon and work was suspended on the main drain and the machine was moved back to about the center of the valley, where work will begin on the excavation of the East Drain.

*Operation and maintenance.*—Work was continued the early part of the month on the repairs to the project main canal, Yuma Indian Reservation, about 30,000 cubic yards being moved. On the Yuma Reser-

vation lateral system the Ruth dredge cleaned 4.4 miles of canal; about 2½ miles of canal were cleaned by team and hand.

In the Yuma Valley the Monighan dragline No. 2 moved 3,800 cubic yards of silt, West Main Canal, station 866 to station 883. The Monighan dragline No. 1 moved 5,600 cubic yards of silt, Central Canal, station 1 to station 20. The V machine cleaned 16½ miles of laterals.

Water was turned into the main canal on March 4 and has been running continuously, so as to meet the heavy demand for water occasioned by having the supply shut off February 10. About 25,200 acre-feet of water were delivered to approximately 45,000 acres.

Ground was prepared and cotton planted during the month. New interest has been promoted in the growth of Egyptian long-staple cotton by several of the large fire companies contracting for the coming crop at a good price. It is expected that about 15,000 acres will be planted to long staple this season.

Bids for the sale of mesa lands were opened each Tuesday during the month and 19 tracts containing 310 acres were sold.

The maximum discharge of the Colorado River during the month was 53,700 second-feet; minimum, 10,100 second-feet; mean, 18,100 second-feet. The gage on March 31 was 17.7 with discharge of 19,700 second-feet. The acre-feet discharge for the month was 1,112,926.

F. E. Weymouth, chief engineer, visited the project on the 17th and 18th. C. M. Day, engineer, arrived from Denver on the 25th to conduct tests at the boundary pumping plant. E. W. Burr, district counsel, recently assigned to this district, was on the project for two days at the end of the month.—R. M. Priest.

ORLAND PROJECT, CALIFORNIA.

March temperatures were below normal. There were 2.55 inches of rain, which is about the average for the month. The total rainfall for the season at the close of the month was 6.6, which is about 11 inches below the seasonal normal. The situation as to irrigation water was somewhat improved, but the shortage is likely to be extreme. The accumulation of storage during the month was 4,000 acre-feet, and the total stored supply at the close of the month 10,610 acre-feet. All of the flow of Stony Creek at the diversions was used for irrigation. When delivered to the land this amounted to 1,700 acre-feet and was used almost entirely in irrigating alfalfa. A force of 35 laborers and 10 head of stock was employed on concrete lining; 6,245 linear feet of laterals 40, 50, and 70 were lined, requiring the placing of 11,600 square yards (444 cubic yards) of lining. Three minor structures were built. A. N. Burch.

GRAND VALLEY PROJECT, COLORADO.

March weather was very disagreeable and conditions were unfavorable for outside work. Frequent rains and snowstorms kept the roads in poor condition and seriously delayed construction and maintenance work. Much difficulty was experienced in securing sufficient labor for the needs of the project.

The project farmers were beginning their spring work and some fields were plowed when the weather permitted, but, on account of the backward season, most of them are at least two weeks behind with their work. Due to the long feeding season, all forage



crops have been nearly exhausted and alfalfa is bringing \$30 per ton in the stack.

The maintenance force was employed burning weeds, cleaning laterals, painting metal flumes, repairing structures, and on other work necessary to put the irrigation system in good condition for the season's operation. Work was started during the month on the lining with concrete of a section of the main canal 500 feet long between tunnels 2 and 3, which in past seasons has been difficult to safely maintain. This work was pushed as rapidly as the available labor supply and unfavorable weather conditions would permit and at the end of the month 2,650 square yards of lining had been completed, involving the placing of 330 cubic yards of concrete; the job was 75 per cent complete.

In the Grand Valley drainage district operations were resumed on the C drain on the 1st of the month and one dragline was operated thereafter on this drain two shifts per day, completing 2,358 linear feet, involving 15,000 cubic yards of excavation. The second dragline was started on the I drain on March 20; 315 linear feet of drain, involving 2,500 cubic yards of excavation, were completed and the dragline was then moved to the H drain. The third dragline was not operated during the month. The structure crew installed two culverts under the Grand Valley Canal.—*S. O. Harper.*

#### UNCOMPAHGRE PROJECT, COLORADO.

March weather was stormy, blustery, and unfavorable for farm and operation and maintenance work.

The prices of farm products remained about the

same, except that potatoes increased to \$5 per hundredweight and good potato seed even higher.

A small amount of water was carried in all canals during the latter part of the month, and onions and a small acreage of wheat were irrigated.

Brushing was completed and the lateral system cleaned several times of weeds after severe wind storms. Numerous wooden structures were repaired or replaced. Fair progress was made in repairing the concrete lining of the South Canal near Mile Post 2, where a crew of 12 to 15 men were engaged throughout the month.

The construction of the Stutheit lateral was commenced. Location surveys were continued on the Miller lateral.

Work is in progress at Delta on both the sugar factory and a canning factory. A wing is being constructed on the high school building at Olathe, which will nearly double the size of the building when completed.—*Fred D. Pyle.*

#### BOISE PROJECT, IDAHO.

The average temperature for March was below normal and was accompanied by intermittent showers and snow flurries. The precipitation for the month was in excess of normal by 0.45 inch. Several light and killing frosts occurred. Weather conditions did not interfere with construction work to any great extent.

*Labor.*—Considerable difficulty was encountered throughout March in obtaining sufficient labor and teams to carry on operations at any distance from project towns. In the case of near-by work or where

#### Crop report, Grand Valley project, Colorado, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.		Per unit of yield.	Values.	
			Total.	Average per acre.		Total.	Per acre.
Alfalfa hay.....	1,753	Ton.....	5,935	3.4	\$17.63	\$104,644	\$59.69
Apples.....	262	Pound.....	956,370	3,650	.0246	23,536	89.83
Barley.....	30	Bushel.....	697	23.2	1.61	1,125	37.50
Beans.....	99	do.....	993	10	5.03	5,018	50.69
Beets, sugar.....	2,063	Ton.....	17,725	8.6	13.00	230,425	111.69
Beets, tops.....	2,063	do.....	12,378			12,378	6.00
Corn, Indian.....	832	Bushel.....	20,423	24.6	2.14	43,719	52.55
Corn, fodder.....	512	Ton.....	1,043	2	7.35	7,673	14.99
Garden.....	52	do.....	4,405			4,405	84.71
Hay (not alfalfa).....	281	Ton.....	356	1.3	14.43	5,136	18.28
Oats.....	811	Bushel.....	21,601	26.7	1.04	22,408	27.63
Peaches.....	4	Pound.....	45,816	11,454	.022	1,022	255.50
Pears.....	65	do.....	274,292	4,220	.037	10,190	156.77
Potatoes.....	287	Bushel.....	17,845	62.2	1.09	19,434	67.71
Straw.....	2,398	Ton.....	1,199	.5	5.00	5,995	2.50
Tomatoes.....	167	do.....	1,359	8.1	13.00	17,667	105.79
Wheat.....	1,587	Bushel.....	25,962	16.4	1.95	50,650	31.92
Miscellaneous.....	141	do.....	5,204			5,204	36.91
Less duplicated areas.....	4,508						
Cropped.....	8,899						
Total and average.....						570,629	64.12
			Areas.		Acres.	Farms.	Per cent of proj- ect.
Nonbearing orchard.....	21		Total irrigable area farms reported.....		15,951	324	31.9
Young alfalfa.....	1,177		Total irrigated area farms reported.....		10,049	320	20.1
Ground fall-plowed.....	1,123		Under rental contracts.....		10,049	320	20.1
Less duplicated areas.....	1,479		Cropped area farms reported.....		8,899	315	17.8
Other purposes.....	308						
Total irrigated.....	10,049						

the watermaster's headquarters are located in a project town this trouble was not experienced, although labor was not plentiful at any time.

**Farming operations.**—The larger portion of all lands being put into grain was seeded during the month. In some sections the planting of early potatoes is well under way.

Stock which was brought down from the mountains last fall for winter feeding is being taken back for summer grazing. The shearing of sheep is in progress.

**Water supply.**—The total discharge for Boise River during the month was 90,440 acre-feet as compared with the mean for the past 25 years of 172,112 acre-feet.

**Operation and maintenance.**—The main canal was operated most of March with the object of filling Deer Flat Reservoir. From the 3d to the 9th, inclusive, the water was turned out in order that the canal could be inspected and any repairs required could be made prior to the commencement of the irrigation season. Maintenance work, including canal cleaning, repairs to structures, etc., was in full progress.

**Construction.**—Several structures were installed to take care of new lands coming under irrigation during the present season. Work was continued on the suspended contract of William Long for the construction of a portion of the Notus Canal.

**Drainage.**—Two drag-line excavators, each working two shifts daily, continued on the drainage work in the Riverside irrigation district. Good progress was maintained throughout the month.

**Surveys.**—The engineering forces were engaged in making surveys for small lateral extensions, classifying lands as to irrigable areas, and giving grades for miscellaneous construction work.

**Visitors.**—Official visitors were former Chief Accountant F. L. Cavis; Consulting Engineer F. W. Hanna; Chief Counsel Will R. King; and R. M. Patrick, assistant district counsel.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

March weather was generally unpleasant and windy, but favorable for construction work except for the fact that the nights were rather cold, necessitating some protection to concrete.

#### Crop report, Boise project, Idaho, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	41,851	Ton.....	180,169	4.31	\$14.58	\$2,626,850	\$62.77
Alfalfa seed.....	250	Bushel.....	782	3.13	16.98	13,277	53.10
Alsike seed.....	19	do.....	89	4.68	21.30	1,896	99.79
Apples.....	2,159	Pounds.....	5,211,759	2,413.97	.02	128,248	59.40
Barley.....	2,222	Bushel.....	65,121	29.31	1.43	93,190	41.94
Beans.....	55	do.....	1,307	23.76	2.95	3,857	70.11
Beets, sugar.....	1	Ton.....	3	3.00	10.00	30	30.00
Cane.....	14	do.....	114	8.14	9.16	1,045	74.60
Clover hay.....	4,686	do.....	7,748	1.65	14.79	114,591	24.45
Clover seed.....	4,823	Bushel.....	16,927	3.51	25.83	437,148	90.64
Corn, ensilage.....	15	Ton.....	190	12.67	8.42	1,600	106.67
Corn, fodder.....	1,125	do.....	6,575	5.84	8.35	54,922	48.82
Corn, Indian.....	4,439	Bushel.....	174,204	39.24	1.45	253,016	57.00
Corn, pop.....	36	do.....	1,075	29.87	2.58	2,772	77.00
Corn, sorghum.....	41	do.....	1,873	45.68	1.90	3,565	86.96
Corn, sweet.....	17	do.....	410	24.12	4.23	1,734	102.00
Fruits, small.....	106	Pounds.....	212,057	2,000.00	.05	10,459	98.67
Garden.....	478	do.....	35	15.10	35.150	73.54	
Hay, miscellaneous.....	299	Ton.....	401	1.34	14.29	5,731	19.17
Millet seed.....	17	Bushel.....	353	20.77	4.33	1,528	89.85
Oats.....	2,407	do.....	73,660	30.60	1.20	88,259	36.67
Onions.....	29	do.....	694	23.94	1.97	1,366	47.12
Onion seed.....	2	Pounds.....	2,000	1,000.00	1.00	2,000	1,000.00
Pasture.....	7,613	do.....	154,300	20.27			
Peaches.....	98	Pounds.....	317,670	3,241.54	.02	9,165	93.52
Pears.....	8	do.....	2,970	396.00	.09	260	34.67
Prunes.....	701	do.....	730,200	1,041.65	.04	26,759	38.17
Potatoes, white.....	2,777	Bushel.....	533,175	192.00	1.23	653,306	235.25
Potatoes, sweet.....	82	do.....	20,110	245.25	1.50	30,204	368.34
Rye.....	108	do.....	1,107	10.25	1.81	2,008	18.60
Wheat.....	28,107	do.....	780,394	27.77	1.91	1,490,883	53.04
Miscellaneous.....	144	do.....				5,785	40.17
Less duplicated areas.....	5,636						
Cropped.....	99,693	Total and average.....				6,254,904	63.12
			Areas.		Acres.	Farms.	Percent of project.
Nonbearing orchard.....	343	Irrigable area farms reported.....			123,772	2,544	74.8
Young alfalfa.....	3,302	Irrigated area farms reported.....			103,782	2,544	62.7
Young clover.....	289	Under water-right applications.....			97,076		58.7
Ground, fall plowed.....	1,367	Under rental contracts.....			6,706		4.0
Miscellaneous.....	256	Cropped area farms reported.....			99,093	2,544	59.9
Less duplicated areas.....	868						
Other purposes.....	4,689						
Total irrigated.....	103,782						



Ample labor was secured by making shipments from Salt Lake City, Utah, and Butte, Mont.

During the month the automatic headworks structure at the intake of the main canal was completed with the exception of installing the gate, and Deer Gulch siphon was completed. Satisfactory progress was made on the combination gunite and concrete flume and on the installation of the precast flume. Camp 4 was shut down during the month.

One engineering field party was engaged in making surveys for the structures to be installed during next season's work.

The office engineering and clerical forces were employed in routine work. The annual project history was forwarded early in the month.

The operation and maintenance forces working under the King Hill Irrigation District's management started work on lining the new section of canal which was constructed around the break between Stations 719 and 727. Also considerable work was done in getting the canal ready for the spring run of water.

Official visitors included A. J. Wiley, consulting engineer; B. E. Stoutemyer, district counsel; J. L. Savage, designing engineer; George Pierce, cement expert of the Bureau of Standards; K. P. Gerard, chemist for the Ogden-Portland Cement Co.; and Mr. Hart, manager of the Ogden-Portland Cement Co.—*Walter Ward*.

#### MINIDOKA PROJECT, IDAHO.

On the South Side pumping unit cleaning crews were started on March 8 and reached a maximum of 11 crews, totaling a maximum of about 46 men and 21 two-horse teams. The cleaning was completed on the 27th. One maintenance crew worked on repairs and replacing of small structures all the month. Since the 28th two additional small crews were on repairs to structures.

Water was turned into the Main South Side Canal on the 30th and the pumping stations were started on the 31st and water delivered to the G and H Canals.

Office work on the profiles of drains on the North Side gravity unit was practically completed. The reclassification of irrigable areas on the gravity unit continued throughout the month. At the end of March a total of 66,080 acres had been examined, of which 48,000 acres were examined during March.

The contract for the construction of the American Falls reservoir, Idaho, was approved as to form by the Secretary of the Interior on March 6, 1920. The contract was mimeographed and sent out to various canal companies and irrigation districts who had indicated the amount of storage for which they were ready to contract. Letters were also sent to other companies, advising them that the contract is ready for signature and asking them to advise as to the amount of storage desired.

Discharge at Howell's ferry amounted to 279,515 acre-feet as compared with 278,841 acre-feet for February. At Jackson Lake the gates remained closed throughout the month, and the water surface rose from 6,737.20 on February 29 to 6,738.50 on March 27, corresponding to a storage of 24,690 or 153,450 acre-feet on March 27. On the corresponding dates last year the storage for the month up to March 27 amounted to 28,230 acre-feet and a total of 337,970 acre-feet of storage on March 27.—*Barry Dibble*.

#### HUNTLEY PROJECT, MONTANA.

The first 15 days of March were stormy and cold, preventing outside field operations. All snow had melted by the end of the month and roads were fast becoming passable.

The timber structural work for the Link flume was cut and assembled as far as possible in the yards.

On the 14th Fly Creek suddenly reached a flood stage and equaled the high-water mark of 1912. Water went over the canal banks at the Fly Creek siphon and washed away a section of the canal bank about a mile below.

On the 19th supplemental construction and operation and maintenance work was begun, and by the 31st field operations were being carried on with all available forces.

A marked shortage of labor and teams is materially retarding work. In the vicinity of Pompeys Pillar it was practically impossible to secure help of any kind.

On the 31st A. C. Cooley, agriculturist in charge of demonstrations on reclamation projects, called at the project office. W. F. Sha, traveling bookkeeper, was in the project office from March 9 to the end of the month.—*Wm. M. Green*.

#### MILK RIVER PROJECT, MONTANA.

March weather was in general mild and reasonably favorable for construction work. The spring break-up occurred from the 13th to the 31st, with only a comparatively small run-off and ice flow. The river was clear of ice on the 30th. Water from melting snow caused only slight damages to the canals and laterals, which can be easily repaired. The labor situation is serious, the supply being very limited and the wages high.

Construction work consisted of back filling a few small structures and fabricating lumber for turnouts, checks, drops, etc.

Maintenance work consisted of painting metal work, repairing gages, weirs, etc., and placing canals in condition for operation. The Dodson South Canal was put in commission on the 23d, and about 1,700 acre-feet were delivered to Nelson Reservoir.—*Geo. E. Stratton*.

#### SUN RIVER PROJECT, MONTANA.

March weather was generally cold, windy, and disagreeable, especially during the early part of the month.

Farmers were employed in constructing and repairing farm buildings, hauling manure, forage, etc., and in cleaning wheat and other grains for seeding. Shipments of hay for feeding were received from points outside the project. Some plowing was done by the farmers during the latter part of the month.

On the Fort Shaw Division two maintenance crews were employed during the greater part of the month, hauling and placing rock paving and rip rap, constructing some new ditches, cleaning laterals, and raising banks.—*Geo. O. Sanford*.

#### LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

March weather was about normal. During the first week the temperature was very cold and 21° below zero was recorded. This was followed by spring-like weather until the 15th of the month, when eastern Montana and the Dakotas experienced one

of the worst blizzards for several years. Only about 6 inches of snow fell, but the heavy wind drifted the snow in piles that closed all traffic for several days and considerable stock was lost in the storm. At the end of the month practically all the snow had disappeared other than small quantities in coulees caused by the blizzard on the 15th.

Ice in the Yellowstone River on the upper end of the project started to move on the 16th of the month. Ice jams were numerous and the low lands in the vicinity of Burns and Fairview were submerged for four days. Due to the ice jam at Glendive the heavy fill of the Northern Pacific Railway from Glendive to Sidney, near Glendive, was badly damaged and all train service was suspended for seven days.

The hearing on the organization of the Lower Yellowstone Irrigation District No. 1 was held in the district court at Sidney on March 4. Only three landowners protested against the inclusion of their lands within the boundaries of the district. A decree was handed down establishing Lower Yellowstone Irrigation District No. 1, subject to possible amendment of boundaries in these three cases. The hearing for irrigation district No. 2 (North Dakota) will be held some time during early May. As in the case of irrigation district No. 1 it is anticipated that few landowners will protest against the inclusion of their lands within the North Dakota district.

Due to the frozen condition of the material, it was necessary to close down operation of Monighan machine No. 2 on the 6th of the month. At times when the weather was favorable the dragline crew was engaged in overhauling and repairing the machine preparatory for spring work.—*L. H. Mitchell.*

## NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

March weather was unfavorable for construction work. Two heavy snowstorms occurred, one on the 5th and one on the 27th, the first accompanied by a severe cold wave. High winds and very bad road conditions were prevalent during a greater part of the month. The mean temperature was 2.1 degrees below the average for March.

**Operation.**—No water was delivered for irrigation purposes. The first 25.5 miles of the Fort Laramie Canal were operated to furnish water for the Lingle power plant. No difficulties were encountered with the exception of a small break in the canal bank at Mile 23.4, which was quickly repaired.

**Maintenance.**—Very little work was done during the month on account of the unfavorable weather conditions. Preparations were, however, under way for the general opening of spring work.

Monighan dragline No. 4 resumed work on the Interstate Canal banks on March 26; 365 feet of canal banks were strengthened during the working period.

The dredge resumed work on the enlargement of the Interstate Canal on the 12th and during the working period enlarged 1,275 lineal feet to a base width of 35 feet.

**Crops.**—There was very little crop movement during the month. The late snows and rains will undoubtedly be a great help to the spring crops, as well as to the winter wheat.

**Live stock.**—Approximately 25,000 sheep and 1,000 cattle were shipped out during the month, leaving approximately 25,000 sheep and 4,000 cattle still on feed on the project.

## Crop report Lower, Yellowstone project, Montana-North Dakota, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Value.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	9,696	Ton.....	21,550	2.2	\$21.00	\$452,550	\$46.67
Alfalfa, new.....	533	do.....	165	0.3	20.00	3,300	5.97
Alfalfa seed.....	103	Bushel.....	394	3.8	21.00	8,374	81.30
Barley.....	780	do.....	12,660	16.2	1.00	12,660	16.23
Beans.....	26	do.....	160	17.7	6.60	1,056	116.77
Beets, sugar.....	380	Ton.....	3,500	9.2	10.00	35,000	92.10
Corn.....	174	Bushel.....	5,116	29.4	1.30	6,651	38.22
Corn fodder.....	148	Ton.....	880	6.0	14.50	12,760	86.22
Flax.....	465	Bushel.....	3,400	7.3	3.70	12,580	27.05
Garden.....	112	do.....	858	1.3	18.00	15,444	23.40
Hay.....	660	Ton.....	858	1.3	18.00	15,444	23.40
Oats.....	1,666	Bushel.....	46,660	28.0	.85	39,653	23.80
Pasture.....	420	do.....	23,450	130.3	1.50	35,175	195.32
Potatoes.....	180	Bushel.....	86,800	13.7	2.40	208,324	32.88
Wheat.....	6,335	do.....	86,800	13.7	2.40	208,324	32.88
Miscellaneous.....	26	do.....				5,940	228.46
Total.....	21,724						
Less duplicated areas.....	135						
Cropped.....	21,289						
Trees.....	11						
			Total and average.....			869,117	40.82
			Areas.....				
			Irrigable area farms reported.....	35,340	455	90	
			Irrigated area farms reported.....	21,300	405	55	
			Under water right applications.....	1	1		
			Under rental contracts.....	21,299	401	55	
			Cropped area farms reported.....	26,785	455	68	
Total irrigated.....	21,300						

<sup>1</sup> Includes \$1 per ton for beet top.



*Drainage.*—On the Interstate unit work was resumed on the construction of the Lower Nine Mile outlet drain. Monighan dragline No. 2 was overhauled and moved 7.5 miles to begin work on this drain, and a crew was started on the structure work. Preparations were made to complete the Winters Creek closed drain; the Austin trench machine was overhauled and moved to the site of the work and four carloads of drain tile were unloaded for this purpose. Monighan dragline No. 3, which is leased to the Mitchell Drainage District, resumed work for the district on the 22d.

On the Fort Laramie unit electric dragline No. 2 continued work on the Cherry Creek Drain, operating with two shifts daily. A total of 28,646 cubic yards of material were moved and 0.72 mile of drain completed. Piling were driven for one highway bridge over this drain.

*Construction, storage unit.*—The installation of the plant required for the construction of the new North Tunnel outlets was completed and everything was ready to start drilling.

*Interstate unit.*—Work was started by the contractor on the construction of a five-room house in Mitchell, Nebr., for the use of the district counsel.

*Fort Laramie unit.*—Electric drag line No. 1 completed the return trip from station 0 to station 536 on the Main Springer lateral and began work on the 15th working toward the end of the lateral. During the month this machine excavated 20,470 cubic yards of class 1 and 2,900 cubic yards of class 2 and completed 1.25 miles of lateral. Drag line No. 5 continued work on the Fort Laramie Canal, encountering a considerable amount of classified material; 30,059 cubic yards of class 1 material were excavated and 9,817 cubic yards of class 2. Drag line No. 5 continued work on the Horse Creek lateral, working between station 39 and station 2 and excavating 37,425 cubic yards of class 1 and 1,925 cubic yards of class 2.

In removing classified material on the Fort Laramie Canal, 2,868 linear feet of holes were drilled and 100 pounds of dynamite, 4,735 pounds of T. N. T., and 2,775 pounds of black powder were used.

Work was continued on the construction of concrete structures on the Cherry Creek lateral system. The concreting of Siphon No. 1 on the Cherry Creek lateral was completed, a total of 333 cubic yards having been placed. The check at Mile 80, the two-way turnout and weir at Mile 7.7 and the concrete culverts at station 548 and station 586 were completed. On the Cherry Creek sublaterals 14 drops, 2 farm turnouts, 4 weirs, 1 check, and 3 road culverts were completed on lateral 12.6 and the excavation completed for the structures on lateral 12.

Work was started on the 22d by a grader on dump wagon outfit on the earth lining of the Fort Laramie Canal at various points to reduce the seepage losses; 1,623 cubic yards of material were placed during the working period.

*Northport district.*—Work was continued by the Government forces on the excavation of schedule 1 of the Northport Canal. Conditions became more favorable during the latter part of the month and good progress was made. Work was also continued on the construction of the permanent camp at Indian Creek.

*Summary of electric drag-line operation.*—Following is a summary of the results obtained in the operation of the four Bucyrus class 9½ electric drag lines on the Fort Laramie unit:

	For month.	To date.
Number of 8-hour shifts.....	177	1,643
Miles excavated:		
Main canal.....	0.37	1.66
Laterals.....	1.95	27.31
Drains.....	.72	8.60
Total.....	3.04	37.57
Total excavation, cubic yards.....	115,010	1,170,193
Class 2 excavation, cubic yards.....	14,642	99,761
Class 3 excavation, cubic yards.....	100	250
Average, cubic yards, per shift.....	650	712
Average kilowatt-hours per cubic yard.....	.64	.53

*Power-house operation.*—The Lingle power plant was operated continuously throughout the month with three shifts daily with no operation difficulties.

*Surveys, Interstate unit.*—The drainage field party worked a large portion of the month on surveys for the additional construction work to be done on the Lower Nine Mile outlet drain. Alignment on grades was also established for the work to be done on the Winters Creek closed drain. The operation and maintenance field party work on miscellaneous lateral and irrigable area investigations.

*Fort Laramie unit.*—One party from Fairview camp was engaged on extending the Horse Creek lateral location to the proposed point of diversion on Horse Creek.

One party at Kiowa camp continued work on the final location of the Fort Laramie Canal in Nebraska. These two parties also furnished lines and grades for the electric drag-line work.—*H. C. Stetson.*

#### CARLSBAD PROJECT, NEW MEXICO.

The weather was cold and windy during March. There was enough sunshine to start vegetation, but little growth. There was no precipitation.

Construction work initiated for the Pecos Water Users' Association in February was completed on March 27. Placing of concrete commenced on the first of the month and the work was carried to completion without interruption; some delay was occasioned by difficulty in securing and holding good labor. The men employed were generally untrained in this class of work, and it was not until the completion of the job that the men showed proficiency. Twenty-seven hundred feet of new work was completed, at a cost of \$2 per square yard. There was no other construction work by Government forces or by contract during the month.

*Operation and maintenance.*—Water was turned into the canal for irrigation on the 17th of the month, but as the weather was generally cold and windy only a little water was used until the end of the month. The water used was for grain and alfalfa. Two small forces under subforemen completed the maintenance work on the canal and lateral systems. The regular men were employed on construction work on the Black River Canal.

The run-off of the Pecos River at the Dayton station averaged 420 acre-feet during the month. The total run-off amounted to 13,600 acre-feet. Water was wasted through the reservoir headgates at short periods during the entire month. Both reservoirs were full at the end of the month.

Several farms changed hands during the month. A 160-acre farm, known as the "Benson Ranch," was sold to a man from the Indian reservation on the Yuma project. Progress of work in preparation for spring planting was well advanced at the end of the month, practically all of the plowing having been completed. The cotton crop had all been picked and ginned, and all except a small quantity of low-grade cotton had been shipped. On account of cold nights and cool windy days, no irrigation had been done in preparation for planting cotton as is common at the end of March. It is probable that little cotton will be planted before April 10. Cotton and alfalfa prices remain at last month's level.

Visitors to the project included F. E. Weymouth, chief engineer, and R. F. Walter, assistant chief of construction, on March 3; C. E. Piatt, examiner of accounts, from March 4 to 10; Allen P. Joy, inspector Department of the Interior, from March 28 to 30, inclusive; P. W. Dent, district counsel, from March 17 to 22, inclusive.—*L. E. Foster.*

#### NORTH DAKOTA PUMPING PROJECT.

Intermittent storms made conditions bad for work during March. Several attempts to commence maintenance work on canal system were necessarily stopped. On the 15th occurred one of the worst blizzards on record, making all roads impassable, delaying trains for days, and causing loss of live stock and some loss of human life. There was 2.18 inches of precipitation, which was 1.5 above normal, resulting in an accumulated excess of moisture for the year of 1.4 inches.

Some maintenance work was begun on new small timber structures and on boiler furnaces in the power plant, and a new parting was opened in the mine preparatory to summer work.

The power plant was operated for the commercial power contract; 105,571 kilowatt-hours of electrical energy were delivered to the city of Williston. This was 16,141 kilowatt-hours over the amount delivered in the same month in 1919.

About 900 tons of coal were mined, at considerably increased cost due to wage increases.

The ice broke up in the Missouri River March 25, ten days earlier than it has occurred for several years. An ice gorge resulted and brought the river to the highest stage on record. All floating equipment was watched and no damage occurred.—*Wm. S. Arthur.*

#### NEWLANDS PROJECT, NEVADA.

Badly needed precipitation was received during March, coming as both rain and snow, which interfered somewhat with project operations, mainly in making the roads heavy for hauling.

Numerous meetings were held by the board of directors of the irrigation district, water users, and other organizations, mainly for the consideration of drainage matters prior to the drainage election to be held by the district on April 6.

The project manager and district counsel spent several days in Reno on project legal matters.

On March 15 to 17 J. M. Gaylord, electrical engineer, visited the project to consider the feasibility of using Lahontan Reservoir water for lands under Truckee Canal in case of a water shortage for those lands.

On March 20 the project manager left for New Orleans and was absent the remainder of the month.

On March 25 the board of directors of Upper Carson Valley Irrigation District visited the board of directors of the local district organization.

On March 27 District Counsel R. M. Patrick left for Boise, Idaho, having been assigned to that location.

**Construction.**—Excavation work on S lateral system for delivery of water to John W. Freeman Co. ranch was completed by Government excavator No. 2 and by contractors Wood and Spencer. One, No. 132, Hess metal flume, 100 feet in length, was installed in the Freeman lateral across Stillwater slough, and 24 minor timber structures were placed in the S laterals.

Schedules 5 and 6 of the Downs lateral were completed by contractors Shepard and Hancock. Excavation of Conner contract and installation of structures remain to be completed.

Reconstruction of Ph lateral in Soda Lake District was commenced and about 1½ miles were completed and 2 minor structures installed.

Excavation of JI drain in Carson Lake tract continued with drag line No. 4 in operation.

Four of the five tractors owned by the Service were rented by private interests for land-leveling operations.

The spur track to the new shops and yards was installed during the month.

Surveys as required in connection with construction work in progress and for extensions to the lateral system were made.

**Settlement.**—During the month 24 homestead filings were accepted covering 1,585 acres of irrigable lands and 12 private land water-right applications were accepted for a total of 826 acres.

On March 31, under public notice dated March 12, 1920, 19 farm units, covering an irrigable area of 1,415 acres, were thrown open to homestead entry, a 60-day preference right being reserved for soldiers, sailors, and marines. Ten of these units with irrigable areas aggregating 831 acres were filed upon on the opening date. Six tracts of private land involving 446 acres were also made subject to water-right application by this public notice.

**Water supply and use.**—Storage in Lahontan Reservoir increased 22,500 acre-feet during March, no drafts from this reservoir being made. No water deliveries from storage were made for irrigation.

The Truckee Canal was operated for carrying Truckee River water into Lahontan Reservoir for storage and for the operation of the Lahontan power plant.

**Operation and maintenance.**—About 16 miles of laterals were cleaned by the maintenance force.

Approximately 1,500 square yards of brush riprap were placed in the V, S, and L line canals.

Drag-line excavator No. 3 was used for widening the south bank of the S canal near the sugar factory, a length of about 2,164 feet being strengthened.

Several new minor timber structures were installed and 16 structures were repaired. Reconstruction of the Leeteville-Carson Dam telephone line was about 85 per cent completed. Two concrete drops in the L canal were cut down to reduce canal seepage.

Ditch rider G. B. Cook, whose period of employment commenced with the first operation of the distribution system in 1905, resigned to go on his farm. Two new ditch riders were employed.—*John F. Richardson.*

#### UMATILLA PROJECT, OREGON.

The most unfavorable feature during March was the severe wind storms which prevailed from the 23d to the 31st. These interfered seriously with construction work, operation and maintenance activities, and land leveling by the farmers. Temperatures were not abnormal and precipitation was but little below normal.



**Farming operations.**—Because of the backward spring the farmers are much behind with their work and there is practically no demand for irrigation water. The chief activity was that incident to the leveling and seeding of new ground, which was seriously affected by the severe winds. Thirty-one cars of baled and chopped alfalfa hay, 1 car of wool, and 2 cars of hogs were shipped during the month.

**Labor.**—The labor situation on the project has been quite serious. It has been practically impossible to secure enough men to do the regular maintenance work. The construction force engaged on the work of enlarging and lining Canal A has been from 12 to 20 men short. The water users have interested themselves in the situation and are attempting by draft upon themselves to secure for the service a full crew for this work.

**Operation and maintenance.**—The feed canal was operated throughout the month. On the 12th and 27th, respectively, breaks occurred in the Furnish ditch, which imperiled operations for a short time. On the 12th a break occurred in the Furnish Canal just below milepost No. 1. The head of 40 second-feet carried considerable sand and gravel into the feed canal and only the fact that one of the feed canal force discovered the break early and cut the feed canal head promptly saved a disaster. As it was, the canal capacity was considerably affected for a day or so until the bar which had been deposited was worked down. The break in the feed canal which occurred on the 27th was on the south side of Stage Gulch and the waters entered the feed canal over spillway No. 2. A head of 65 second-feet was added to the largest head which the canal had carried during the season and for a few hours things assumed a rather discouraging aspect. No damage resulted, however. From 145 to 300 second-feet were diverted by the canal throughout the month, of which from 180 to 253 second-feet were delivered to the reservoir and from 25 to 35 second-feet to the Echo Mills. Operation of the Maxwell Canal was begun on March 15 and from 6 to 25 second-feet have been diverted continuously since. Except for a few deliveries to lands newly seeded there has been no demand for water.

One small crew on the East Side and two small crews on the West Side have been employed continuously throughout the month on maintenance and small construction work. Sluicing operations have been carried on continuously throughout the month by the operation of two templets.

Water-supply conditions improved materially during the month. There were frequent rains and snows in the Blue Mountains. At the close of the month it was reported that the depth of snow in the mountains equaled that of midwinter. There is every assurance that the moderate flood which has been passing down the Umatilla River throughout the last half of the month will continue throughout April. This practically assures the project of a complete storage supply. It is barely possible if more snow falls and late rains come that water supply conditions will be very favorable for all the irrigated lands in the Umatilla Basin. There is some danger that higher temperatures and chinook winds may cause the supply to run off in early floods, but in view of the fact that the frost is out of the ground in the mountains, this is not expected to result altogether unfavorably.

**Construction.**—*Enlargements and improvements to Canal A.*—Satisfactory progress was made by the Newport Construction Co. on their contract for revision of A Canal at Station 62 and the work was completed on March 18; 6,233 cubic yards of class 1 and

987 cubic yards of class 2 material were moved. Progress by Government forces engaged in lining portions of A Canal was retarded by the inability to secure a sufficient supply of labor. At the close of the month conditions had improved due to the co-operation of the local water users' organizations. About 222 cubic yards, or 2,664 square yards of lining, were placed during the month.

**West side.**—Eight small turnouts and 3 measuring boxes were placed during the month. The outlet of the Barrell flume involving the placing of 4 cubic yards of concrete, was completed.

**General.**—On March 27 the annual meeting of the Umatilla River Water Users' Association was held. President J. F. McNaught outlined the chief matters which had occupied the attention of the executive board during the year. The election of officers resulted in the reelection of the old board. Upon explanation of the situation by President McNaught the water users decided to draft themselves to keep an adequate crew on the A Line Canal work.

**Visitors.**—On March 24 and 25 A. C. Cooley of the United States Department of Agriculture visited the project.—*Maurice D. Scroggs.*

#### Project weather during March, 1920.

Project.	Station.	Temperature, °F.			Precipitation (inches).
		Maximum.	Minimum.	Mean.	
Salt River.....	Phoenix, Ariz.....	83	36	58.4	1.35
Yuma.....	Yuma, Ariz.....	84	41	61.4	.37
Orland.....	Orland, Calif.....	75	30	50.1	2.55
Grand Valley.....	Grand Junction, Colo.....	68	19	40	1.39
Uncompahgre.....	Montrose, Colo.....	68	16	37	.53
Boise.....	Boise, Idaho.....	65	24	40.8	1.89
King Hill.....	Glenns Ferry, Idaho.....	78	21	44	.48
Minidoka.....	Burley, Idaho.....	63	16	37.8	.46
Huntley.....	Ballantine.....	65	-30	31.4	.60
Milk River.....	Malta, Mont.....	65	-21	27.7	.04
St. Mary storage.....	Near Babb, Mont.....	50	-28	26	.4
Sun River.....	Fort Shaw, Mont.....	65	-24	33.5	
Lower Yellowstone.....	Savage, Mont.....	67	-21	29.3	.73
North Platte.....	Wyncoote, Wyo.....	69	-26	34.1	.40
Newlands.....	Fallon, Nev.....	73	16	41.1	.98
Carlsbad.....	Carlsbad, N. Mex.....	83	15		
Rio Grande.....	El Paso, Tex.....	79	24	53.6	.22
North Dakota pumping.....	Williston, N. Dak.....	58	-16	24	2.18
Umatilla.....	Hermiston, Oreg.....	70	15	46	.49
Klamath.....	Klamath Falls, Oreg.....	61	16	37	1.18
Belle Fourche.....	Orman, S. Dak.....	65	-21	31.1	1.02
Strawberry Valley.....	Provo, Utah.....	68	17	39.1	2.67
Okanogan.....	Omak, Wash.....	69	15	41.1	.18
Yakima:					
Sunnyside unit.....	Sunnyside, Wash.....	70	18	44.7	.10
Tieton unit.....	Cowiche, Wash.....	63	23	41.3	.06
Shoshone.....	Powell, Wyo.....	64	-15	33	.01
Indian projects:					
Blackfoot.....	Browning, Mont.....	55	-21	22	.22
Flathead.....	St. Ignatius, Mont.....	66	0	35	1.18
Fort Peck.....	Poplar, Mont.....	63	-24	26.2	.09
Riverton.....	Pavilion, Wyo.....	70	-19	31.2	.85

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

March was generally favorable for outdoor work. There were no severe storms, but there were a number of windy days with some snow or rain. Plowing and farm work generally were in progress, also considerable canal cleaning. The total precipitation for the month of 1.18 inches was about a half inch above the average precipitation for March. However, the total precipitation for the fractional year is only about one-third of the average, based on a 10-year record.

Labor conditions are difficult. Men are hard to obtain; wages vary from \$4.50 to \$5 per day. Three small crews of about four men each were employed on general repair work. Ditch riders in the various districts were engaged in cleaning canals and preparing for running water.

On the 17th work began on drainage for the Ankeny lands with the 1 cubic yard Monighan walking drag line. On the 25th a broken loading drum compelled a temporary shutdown.

On March 5 bids were opened for leasing 93 tracts, covering 8,400 acres of Tule Lake land. Two hundred and seventy bids were received and the total receipts were in excess of \$37,000. The maximum price was \$13.26 and the minimum 50 cents an acre, averaging almost \$4.50 per acre for one year's lease.

On March 8 W. A. Meyer assumed the duties of chief clerk, having been transferred from the Black-foot project.—*Herbert D. Newell.*

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

Weather during March was unusually severe. There was much cold weather with just enough warm days to make roads practically impassable even for team and wagon. Only a little over 1 inch of moisture fell, but it came in the form of snow and was drifted badly by the high winds. On the 14th, 15th, and 16th the heaviest windstorm occurred that has been recorded since the project was started. For a period of 24 hours—6 a. m. of the 15th to 6 a. m. of the 16th—the velocity of the wind was 70 miles per hour, while for 6 hours of this period the average rate was 75 miles per hour. The maximum velocity was between 78 and 80 miles per hour. The last night of the month saw ice 1 inch thick in open vessels.

The diversion canal was operated at capacity continuously throughout the month and delivered 20,000 acre-feet of water to the reservoir. On account of the unusually rough weather and impassable condition of the roads little maintenance work was accomplished. Work on both the Indian and Horse Creek flumes was continued during favorable weather, but an additional two weeks will be required to finish. A small crew worked a portion of the month out from the Vale Camp. A decayed timber chute on the Wood lateral was replaced with two wooden drops, about 40 miles of telephone line was overhauled, some repair work done to the headquarters building at Vale, and repairs made to minor structures. It was impossible to do any maintenance work on the gumbo laterals around Newell. Snow and water remained in the ditches until the end of the month. The manufacture of concrete pipe for the Townsite lateral siphon was delayed on account of failure of reinforcing material to arrive until near the end of the month. This was perhaps fortunate on account of the severe weather which likely would have ruined any pipe not well cured. The pouring of concrete was begun on the last day of the month.

Little farm work has been done toward putting in spring crops. Fields remained frozen until the middle of the month and later were too wet to get into. Little alfalfa hay remains in the country; approximately 2,000 tons of prairie hay have been shipped into Newell alone from the eastern part of the State. The greater part of live-stock wintered on the project is in fair condition and has been run through the winter without serious loss. Much of the range stock is now being driven out to the open

prairie again. Lambing is pretty much over with now and an excellent percentage is reported.

Labor remains scarce and high. Farmers are paying from \$75 to \$85 per month with board. The Service has been unable to secure all of the help necessary. Wages offered were \$4.36 per 8-hour day.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

March weather was generally cold and stormy with a great deal of snow and rain. The precipitation at the east portal of the Strawberry tunnel was 4.42 inches with a minimum temperature of 25° below zero. At the end of the month there were 56 inches of snow on the ground. At Provo the precipitation was 2.67 inches with a minimum temperature of 17°.

The power plant was operated without interruption of any kind and power furnished to the towns of Payson, Salem, Spanish Fork, and Springville. Some additional machinery for the contemplated repairs was received at the plant.

A gang of 15 men and a foreman were sent to the Strawberry tunnel on March 16. Camp was established and 1,600 feet of tunnel floor cleaned. The road from Diamond Switch to the west portal was in poor condition and the last 7 miles was through heavy snow. The electric truck arrived on the last day of the month.

A conference was held with the board of directors of the Springfield Irrigation District for the purpose of straightening out matters pertaining to their option for the purchase of an additional 2,000 acre-feet of water.

A conference was also held with representatives of the Heber Horse & Cattle Growers' Association and the Wallsburg Live Stock Association, the present lessees, in regard to the operation of the grazing lands. A conference was held in Payson on March 31 between representatives of the Strawberry Valley Water Users' Association and the present lessees for the purpose of discussing the conditions covering the operation of the grazing lands.

A delegation representing landowners in east Juab County visited the project office in regard to the extension of the Strawberry Valley project to cover their lands.

A delegation representing the landowners under the proposed Santaquin pumping plant also visited the project office in regard to the status of their petition.

Preliminary estimates of cost of extending the High Line Canal to Current Creek and the proposed Santaquin pumping plant were prepared.

The heavy precipitation during the month will materially increase the run-off into the Strawberry Reservoir and the prospect is that it will be about normal. Some spring plowing is in progress and the condition of the winter wheat crop is excellent.

An agreement was entered into by the beet growers of the State and the various sugar companies whereby the beet growers will receive \$12 per ton for their 1920 beet crop with sugar selling at \$11 per hundred-weight and in addition a payment of \$1 per ton extra for every dollar increase in the price of 100 pounds of sugar above \$11.

One of the important problems before the farmer on the project at the present time is crop rotation. Steps are being taken by the county agricultural agent to teach the farmers the value of crop rotation in increasing the fertility of their land and crop production. For the average sugar-beet grower who is also raising a proper amount of live stock, the fol-



lowing rotation is suggested: Alfalfa, 5 years, followed by potatoes, corn, or tomatoes, 1 year; sugar beets, 2 years; wheat, 1 year; oats or barley as nurse crop to young alfalfa, which completes the 10-year cycle or a 10-year rotation.—*J. L. Lytel.*

#### OKANOGAN PROJECT, WASHINGTON.

For the entire month of March mild weather prevailed. It was warm during the day and most of the night, the temperature standing above freezing. The precipitation amounted to 0.18 on the project lands and 0.32 at Conconully; this is far below the normal and added but little to the project water supply from Salmon Creek water shed.

The shipping of apples was carried forward as fast as possible and due to extreme shortage in refrigerator cars, the warehouses are now shipping apples in trainload lots and loading them in box cars with attendants to regulate the temperature of the apples in transit. The price was about 5½ cents per pound; the price of alfalfa was \$25 per ton and of potatoes \$3.60 per bushel.

The routine office work was carried forward during the month, and a great deal of work was also done by the clerical department on the project in connection with the purchase of sandy land water-right equities and the writing of the annual operation and maintenance report and project history.

Work in the field was carried on, beginning early in the month, on the emergency measures necessary to secure additional water for the project, in digging of wells. About the middle of the month other emergency measures were started in the matter of locating emergency generating plant and at the end of the month the work was going forward on the well digging, dismantling of the generator and switchboard equipment at power plant No. 2, repairs to Duck Lake pumping plant and Salmon Lake pumping plant, and the excavation and placing of forms for the emergency generating plant at Omak.

The project was visited by District Counsel H. L. Holgate in connection with legal matters for the project. He arrived on the project on March 16 and left on March 20.—*Calvin Casteel.*

#### SALMON LAKE DAM.

March weather conditions were uniform, characterized by very little cloudy weather, warm days with cold nights, and light precipitation. By the end of the month, the frost was entirely out of the ground on sunny slopes.

Steam-shovel excavation of the Salmon Lake road was continued throughout the month; 2,144 lineal feet of heavy roadwork was completed. The road is located on steep side hill where the solid rock usually has an earth covering of from 1 to 6 feet. In order

#### Crop report, Strawberry Valley project, Utah, year of 1919.

Crop	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	8,624	Ton.....	23,802	2.8	\$25.00	\$595,050	\$69
Alfalfa seed.....	14	Bushel.....	44	3.1	21.00	924	66
Apples.....	112	Pound.....	554,540	3,905	.025	13,863	98
Barley.....	346	Bushel.....	9,132	26	1.40	12,784	37
Beans.....	30	do.....	1,191	40	1.50	1,786	59
Beets.....	8,014	Ton.....	80,514	10	10.00	805,140	100
Cane.....	13	.....	.....	.....	.....	675	52
Cherries.....	23	Pound.....	68,800	2,991	.075	5,157	224
Clover seed.....	36	Bushel.....	258	7.2	21.00	5,418	150
Clover hay.....	17	Ton.....	75	4.4	24.00	1,800	106
Corn seed.....	186	Bushel.....	4,577	24½	1.35	6,178	33
Corn fodder.....	469	Ton.....	2,944	6	8.00	23,552	50
Fruits, small.....	12	.....	.....	.....	.....	3,244	270
Garden.....	36	.....	.....	.....	.....	1,948	54
Hay.....	437	Ton.....	551	1.3	20.00	11,020	25
Melons.....	13	.....	.....	.....	.....	1,482	114
Oats.....	1,408	Bushel.....	43,336	31	1.00	43,336	31
Onions.....	5	do.....	550	110	1.20	660	132
Pasture.....	1,263	.....	.....	.....	.....	7,754	6
Peaches.....	320	Pound.....	3,564,642	11,140	.027	96,246	301
Peas.....	142	Bushel.....	1,392	10	1.65	2,296	16
Potatoes.....	396	do.....	41,648	105	1.00	41,648	105
Prunes.....	1	Pound.....	5,000	5,000	.03	150	150
Rye.....	6	Bushel.....	42	6½	1.70	71	11
Tomatoes.....	45	do.....	14,451	321	.40	5,780	128
Wheat.....	7,257	do.....	154,107	21	1.85	285,097	39
Cropped.....	29,255	Total and average.....	.....	.....	.....	1,973,059	67½
		Areas.	Acres.	Farms.	Per cent of proj- ect.		
Irrigated, no crop.....	3,657	Irrigable area farms reported.....	33,123	2,400	100		
Summer fallow.....	211	Irrigated area farms reported.....	29,255	.....	88		
		Under water-right applications.....	27,875	.....	84		
Total other purposes.....	3,868	Under rental contracts.....	1,380	.....	4		
Total irrigated.....	33,123	Cropped area farms reported.....	29,255	.....	88		

to drill the rock a large number of side hill trenches are dug by hand to permit drilling; this rock drilling was completed for a distance of 3,400 feet ahead of the steam shovel.

In connection with securing emergency water supply for the present season at the Salmon Lake pumping plant, 28 piles were driven and capped for the support of the pumps and suction pipes at a lower elevation; the moving of the pumps and repair of engine were in progress at the close of the month. Piling was also driven at a new site for the Salmon Lake pumping plant on the upper section of the lake, a 14-mile canal located around the lake to the Salmon Lake dam outlet and about one-fourth of the excavation of the canal completed.

During the last week of the month work was resumed on the Salmon Lake feeder canal in trimming the canal slopes preparatory to placing the concrete lining.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for March was cooler than normal, with very light precipitation and considerable wind. Snow conditions at the various reservoirs at the end of the month were as follows:

	Inches.
Keechelus.....	12
Kachess.....	8
Bumping.....	2
Cle Elum.....	0

*Operation and maintenance.*—Maintenance for the Sunnyside unit consisted of clearing weeds from rights of way and canal sections, repairing gravel slopes, plowing berms, removing silt, and repairing and renewing small delivery structures. At the close of the month the canal system was in shape to begin delivery of water with the exception of a few odds and ends, such as puddling of a few new turnouts, burning of weeds, etc. The pumping plants were practically ready for operation at the close of the month.

On the Tieton unit the regular maintenance work was continued, consisting of grubbing willows, repairing delivery structures, installing special deliveries, repairing telephone line, and completion of work on the new transition at Columbar tunnel, which was started after the close of the irrigation season last fall, but could not be completed at that time on account of freezing weather; also enlargement of a short section of canal in rock formation near mile 20 on lateral G, and some riprap work along North Fork Creek Channel above Dam No. 2.

*Investigation and surveys for new units, Kennewick unit.*—Plans and estimate of cost for the Kennewick irrigation district were completed and sent to Denver for approval.

*Moore unit.*—Organization of the Yakima irrigation district, comprising the lands within this unit, was completed by a vote of the landowners at an election held on March 6.—*R. K. Tiffany.*

#### SHOSHONE PROJECT, WYOMING.

March was normal, except for the severe cold spell coming to a climax on the 6th. Precipitation was slight. The surface frost came out at the middle of the month sufficiently to soften the roads. On the Garland Division for lack of precipitation they again became hard and dry in a few days, except where seepage obtains; but on the Frannie Division they are still in bad condition. Some spring plowing began March 22, but the frost is not yet sufficiently removed to permit all sorts of grading operations.

*Water supply.*—The surface of Shoshone Reservoir dropped 3.7 feet during the month; storage decreased 17,604 acre-feet. Influx from melting mountain snows has not yet commenced.

*Operation and maintenance.*—Heavy maintenance work began March 22, when teams were put on ditch cleaning. Three and one-half miles of laterals were cleaned and several sand bars were removed from the canal. Considerable riprap was placed around Garland Canal drops and the outlet of Pole Cat Creek flume, and in realigning lateral A flume. Four ditch riders' camps are under construction. An extension of 140 feet to the water services in Deaver Camp was also made. Operation consisted of draining Ralston Reservoir to permit cleaning out the inlet of the intake structure of the Powell water supply system and installing a new screen. The reservoir was refilled the 27th.

*Crops.*—The crops are all moved from the farms; 130 cars of alfalfa hay, 21 cars of straw, 1 car of wheat, 1 car of honey, 1 car of potatoes, and 1 car of hogs constituted the bulk shipments to market; 17 cars of cattle put on the project during the winter were returned to the range.

*Labor.*—The labor supply has been in excess of the demand at \$4.75 per day, but the demands of the service have not yet been large. Due to the curtailment of credit, prospects are that local building operations will be small.

*Drainage.*—On the Garland Division permanent test wells were read once during the month. Excavating machinery was put into condition for spring work. The Austin trencher will resume work on closed drain Y about the 1st of April and the Lidgerwood dragline of open drain 26-7 about the middle of April.

On the Frannie Division work was continued on the Howell drain, excavating 650 linear feet and 6,300 cubic yards. Frost, shortage of dragline runners, and soft roads hindered the work. At the end of the month the work was put on a two-shift basis.

*Field and office engineering.*—Little field work was done out of the Powell office during the month. Pole Cat Bench preliminary surveys were completed, drainage test wells were read, and a little work done on Powell town-site subdivision. In the office, work in connection with settlement occupied most of the month; a week was spent on plans and specifications for the new office building; a small supplemental survey was prepared and the work on Willwood irrigable area determinations completed.

Frannie Division field work consisted of topographic surveys of the lower reach of Sage Creek, making surveys for a small supplemental subdivision, land line retracements, and N. I. L. surveys covering 1,800 acres of the third unit. Office work consisted of completion of R. O. W. maps through State school land, layout of some second-unit lateral system structures, and the preparation of drawings for construction camp buildings.

*Settlement.*—March was a very active month in settlement work. Of the 57 units opened to entry on March 13 all but 4 were covered by water-right applications at the time of the drawing. These were all entered by the end of the month. There were 546 applications at the drawing, the most popular piece having 105. Persons attracted by the drawing looked over other vacant lands of the project, and 11 old units were covered by applications during the month, leaving a total of 22 vacant units.

*Collections.*—Operation and maintenance collections were fair during the month. Of the accruals January 1, including 1919 charges, 52 per cent was collected at the beginning of the month and 11 per cent dur-



ing the month. Aside from the new entries construction collections were small.

*Water users' association.*—The water users' ballot, opened March 2, was favorable to the construction of a new office building, the opening to sale of the fair-grounds reserve of Powell town site, and to the organization of an irrigation district of the Garland Division only, but not of a combined Garland and Frannie Division district.

*Construction.*—No construction work of consequence was carried on, except the building of four ditch-rider camps and progress on the erection of a construction camp at Frannie for second and third unit Government forces. No earthwork contractors attempted work.—*Ferd Bonstedt.*

#### INDIAN PROJECTS.

##### FLATHEAD PROJECT, MONTANA.

March weather was moderate though variable. Considerable moisture was stored in the ground but cold nights and lack of sunshine have retarded the growth of crops. Winter wheat seems to be in good condition throughout the project.

Work at McDonald Lake Dam consisted in spillway excavation, hauling materials, bending steel, and preparing a concreting outfit for the spillway. Extremely hard material was encountered in the excavation for the spillway, especially for the pool, and the design was modified to meet this condition.

On the Polson A lateral excavation was carried on as fast as weather conditions permitted. On the flume at station O concrete for the pedestals was placed, the wooden substructure erected, and metal sheets laid.

The field work on the investigation of the Tally Lake Irrigation District was completed and forces and equipment returned to the project. Irrigable area surveys were continued on the Post Division.

No trouble was experienced in securing enough labor to fill the project requirements.

A small amount of maintenance work was done on the repair of structures and in building minor wooden structures for spring installation.

Water was turned out of McDonald Lake on March 30 for storage in Ninepipe Reservoir. The outlets of all other reservoirs were closed. All the streams under observation were at extremely low stages and at the end of the month showed no tendency to rise.—*E. A. Moritz.*

##### FORT PECK PROJECT, MONTANA.

March weather was seasonable with only 0.09 inch of rainfall. A severe wind and snow storm occurred on the 15th which drifted very badly, and resulted in the loss of a large number of range cattle. Labor was very scarce.

No construction work was done during the month.

The creeks broke up on March 25 and water was diverted into Little Porcupine storage reservoir and stored in the Big Porcupine reservoir. Concreting work was started on the F dike of the Little Porcupine reservoir. Little damage was done to the canals by cross drainage water and they can be put into operation at an early date. The discharge of Big Muddy Creek was large and measurements were taken of the flow to Medicine Lake.—*R. M. Conner.*

##### RIVERTON PROJECT, WYOMING.

The temperature during March was about normal. The roads were in bad condition throughout most of

the month, but were improving rapidly at the end of the month.

Dragline No. 2 was operated one shift from March 1 to 28 and two shifts from March 29 to 31. The total amount of excavation moved during March was 9,734 cubic yards, all of class 1 material and most of it heavy coarse gravel. A small quantity of soft shale was encountered in the bottom of the cut. The building of the construction camp was continued.

Topographic surveys were continued by two parties until March 18, when all the field work which could be reached was completed and the field party was disbanded.

It has been found advisable to abandon the petition for the organization of the Midvale irrigation district which has already been signed and prepare and circulate a new petition, in order that the landowners may take advantage of the provisions of the new irrigation district law recently passed by the special session of the Wyoming Legislature.—*H. D. Comstock.*

#### GENERAL OFFICES.

*Washington office.*—The director was in charge of the office during March, except for a few days when he was in New York, Philadelphia, and Boston in connection with the work of the American Society of Civil Engineers, of which he is president, and other engineering matters. On March 3 he attended a hearing before the Committee on Irrigation of Arid Lands of the House of Representatives on Imperial Valley matters, and on March 20 was before the same committee in connection with the bill to grant reservoir rights of way in the Yellowstone National Park to the Fremont-Madison Canal Co. On March 11 he appeared before the House Committee on Appropriations in connection with the estimates for the Reclamation Service.

During the director's absence Mr. Bien was acting director.

Judge King left on March 25 for Boise in connection with the Boise suit.

Among the visitors during the month were the following: F. A. Banks, engineer, Minidoka project, in connection with the American Falls contracts; Mr. Chamberlain, secretary of the Civic League; F. A. Molitor, consulting engineer, New York; former Gov. Sloane, of Arizona; W. B. Kibby, Imperial Valley; R. F. Perkins, banker, Boston; T. C. Winn and Mr. Evans, Nephi, Utah; former Gov. Ammons, of Colorado, and a delegation from San Luis Valley; C. A. P. Turner, engineer and author; Mr. Taintor, Boston; Mr. Tomlinson, secretary of the Livestock Association of America; Richard L. Humphrey, consulting engineer, Philadelphia.

*Denver office.*—The chief of construction and R. F. Walter, assistant chief of construction, were in the field at the beginning of March and during the month visited the Carlsbad, Lower Rio Grande, Rio Grande, Salt River, San Carlos, and Yuma projects, returning on March 24. On March 29 the chief of construction left for Los Angeles to attend the convention of the League of the Southwest. Assistant Chief of Construction Chas P. Williams was in the Denver office the entire month.

Official visitors included Messrs. F. G. Hough, Porter J. Preston, John F. Richardson, A. H. Gullickson, and John S. Longwell.—*R. F. Walter.*

Be a good friend to your cow; she is a good friend to you.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

HON. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSONG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.  
 ARTHUR POWELL DAVIS, Director of the Reclamation Service.  
 WILL R. KING, Chief Counsel of the Reclamation Service.  
 CLAY TALLMAN, Commissioner of the General Land Office.  
 CATO SELLS, Commissioner of Indian Affairs.  
 GAYLORD M. SALTZGABER, Commissioner of Pensions.  
 JAMES T. NEWTON, Commissioner of Patents.  
 PHILANDER P. CLAXTON, Commissioner of Education.  
 GEORGE OTIS SMITH, Director of the Geological Survey.  
 VAN H. MANNING, Director of the Bureau of Mines.  
 STEPHEN T. MATHER, Director of the National Park Service.  
 COL. F. MEARS, Chairman Alaskan Engineering Commission.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Office of the director: Morris Bien, assistant to the director; J. B. Beadle, secretary to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor Reclamation Record; E. C. Bebb and C. A. Bissell, engineers; J. H. Pellen, chief draftsman; A. H. Gullikson, chief accountant; C. E. Piatt, southern district, Denver, Colo., F. G. Hough, northern district, Helena, Mont., examiners of accounts; C. A. Lyman, chief of repayment accounts section; C. E. Harris, auditor of transportation accounts; Mrs. J. T. Davis, chief of auditing section; Miss H. A. Fellows, fiscal agent; R. H. Slaughter, chief of bookkeeping section; C. H. Fitch, chief clerk; C. N. McCulloch, chief of mails and files section; Emmet Carr, purchasing agent; T. E. Brown, chief of stenographic section; G. W. Numbers, appointment clerk.

Office of the assistant to the director: D. H. Sibbett, J. E. Golladay, and A. G. Pollock, counsel; Mrs. G. B. Mathiot and Alfred Dresser, assistant counsel; Mrs. E. W. Ballard, C. E. Womersley, and D. S. Koontz, clerks.

Office of the chief counsel: Ottamar Hamele, assistant to the chief counsel; Geo. A. Ward and E. W. R. Ewing, counsel; Frank J. Bergin, assistant attorney.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter, and C. P. Williams, assistant chief engineers; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD OFFICES OF CHIEF COUNSEL.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Denver, Colo.**—Law section office of chief engineer: E. E. Roddis and Armand Offut, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr and R. J. Coffey, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauff, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Balantyne, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; C. C. Hogue, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. A. Keever, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; C. E. Brodie, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—F. D. Pyle, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppelmann, chief clerk; E. M. Phillebaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; R. V. Sass, superintendent of construction; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk and fiscal agent.

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(For key, see pp. 208 and 209.)



# Reclamation Record

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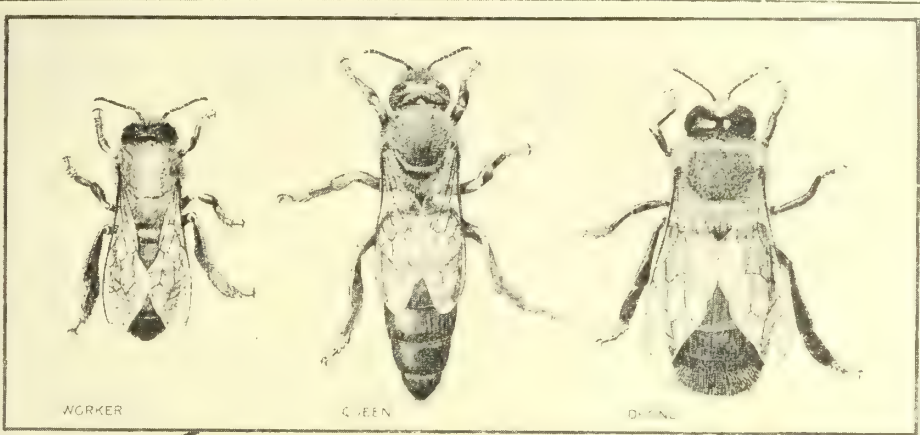
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VOLUME 11, No. 6

PRICE {NOTHING FOR OUR WATER USERS.  
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JUNE, 1920



A BUSY INDUSTRY ON OUR PROJECTS.



**SECRETARY PAYNE URGES THRIFT.**

Department of the Interior,  
Washington, D. C.

To Members of the Interior Department:

Out of the experiences of war, the American people have learned the power of small savings. More than 20,000,000 of our people have lent the Government the billions of dollars necessary to win the victory. People who never knew that they could save put aside small sums in order to aid their country, and in the process of aiding their country they found that they were helping themselves—that they were, for the first time, putting aside something for the future.

No apology need be made for coupling with your pay envelopes the earnest suggestion that you hold fast to the "thrift" idea through the purchase of Government Savings and Thrift Stamps. Most Government workers are dependent entirely upon their salaries. Their first thought should be given to the amount that can be taken from each pay envelope for safe investment. There is no safer investment than these Thrift and Savings Stamps of our Government. I urge their purchase as the exercise of care and prudence in effecting personal savings, and in converting such savings into safe and profitable investments.

JOHN BARTON PAYNE, Secretary.

## THE HIGH LINE UNIT OF THE STRAWBERRY VALLEY PROJECT, UTAH.

By J. L. Lytel, Former Project Manager.<sup>1</sup>

The Strawberry Valley project is made up of the following units and districts:

1. The High Line unit, on which a canal system has been built by the Reclamation Service and turned over to an organization of the water users to operate and maintain.

2. The Springville and Mapleton irrigation districts, where a main lateral only was built, a lateral system having been constructed by the landowners for the purpose of using waters from Hobbie Creek. This lateral is being operated jointly by the two districts.

3. The Spanish Fork unit, on which no new work was done, as the old canal system covering these lands, which is made up of five main canals and lateral system, was considered adequate to irrigate the land.

All the canal systems on the project are operated by organizations of the water users, the Reclamation Service delivering water in bulk at the headings of the different main canals.

The accompanying project map shows the relative location of the different units.

The High Line unit covers about 22,000 acres, located on the south end of the project in the vicinity of Salem, Payson, and Santaquin, and is supplied with water from a canal system made up of a main canal 17½ miles long, which has a capacity of 300 second-feet for the first 10 miles and 250 second-feet for the remainder. The lateral system is 71.2 miles in length, with capacities varying from 60 second-feet down to 6 second-feet.

The Main High Line Canal takes out of the Main Distribution (Power) Canal at the power plant at the mouth of Spanish Fork Canyon and follows around the base of one of the Wasatch ranges through a rather rough country that appears at one time to have formed the shore line of old Lake Bonneville. The first 4½ miles are located along the westerly slope of a comparatively steep mountain side; then through a rolling country made up of a series of projecting ridges; thence across the upper end of a gently slop-

ing valley south of the town of Salem to the alluvial fan forming Payson Hill, which is made up of sand, gravel, and large water-worn boulders. From Payson Hill it crosses Peteetneet Creek canyon and follows along the base of the foothills for a distance of about 2½ miles; thence across an arm of Utah Lake valley north of Santaquin; thence through Goshen Pass, crossing the Denver & Rio Grande Railroad west of the pass and extending northwest to the end of the main canal.

All but a few of the structures on the main canal and lateral systems were built of reinforced concrete, and on account of the nature of the material through which the canal is built it was considered advisable to line the main canal for more than one-third of its length and the greater part of the lateral system with reinforced concrete in order to prevent loss of water by seepage and the water-logging of valuable land by water thus lost. This type of construction for the lateral system greatly simplified the location, did not take up so much valuable land for right of way, and lessened the cost of operation and maintenance.

A reinforced concrete flume section 5 feet in height by 9 feet in width, inside dimensions, with bottom and sides 6 inches thick, was adopted for part of the canal located along steep side slopes where the material was largely fine sand and silt. Expansion joints filled with mineral rubber (sarco) were placed at intervals of 100 feet to prevent the flume from cracking, due to changing temperatures. At points where loose gravel and blow sand and silts were encountered the flume was covered with a slab of concrete 6 inches thick. It was built on a wide bench excavated out of the hillside, cross drains being provided under it to prevent water from accumulating on the upper side. Photograph No. 2 shows a section of this flume with a transition from an earth section of the canal.

More than 6.5 miles of the main canal were lined with concrete 4 inches thick reinforced with rectangular and triangular woven-wire mesh placed in the

TABLE 1.—*Hydraulic elements, Main Canal Sections.*

	Section.	"n."	"s."	"b" feet.	"d" feet.	"A" square feet.	"p" feet.	"r" feet.	"v" feet per second.	"Q" cubic feet per second.
A.	Earth.....	0.025	0.0004	12	5.60	106.40	30.01	3.54	2.77	295
B.	Earth.....	.025	.0004	10	5.50	92.81	27.72	3.35	2.66	247
C.	Earth.....	.0225	.0004	20	4.10	107.23	34.81	3.08	2.79	299
D.	Earth.....	.0225	.0004	18	3.90	93.03	32.06	2.90	2.68	249
E.	.....	.012	.0012	8	5.00	40.00	18.00	2.22	7.42	297
F.	Concrete flume.....	.012	.0012	9	4.45	39.80	17.32	2.30	7.60	302
G.	Concrete flume.....	.012	.0012	8	4.40	34.95	16.22	2.15	7.27	254
H.	Concrete-lined section.....	.012	.0012	6	4.00	40.56	17.31	2.31	7.61	304
I.	Concrete-lined section.....	.012	.0012	6	3.60	34.50	16.18	2.14	7.25	251
J.	Concrete-lined section.....	.012	.0004	9	4.50	60.75	21.73	2.80	4.96	301
K.	Concrete-lined section.....	.012	.0004	8	4.30	52.89	20.16	2.62	4.76	252

<sup>1</sup> Mr. Lytel is now project manager of the Yakima project, Wash.



middle of the slabs forming the bottom and sides. The lined sections are 8 feet wide on the bottom with 1:1 slopes and a water depth of 4.3 feet, the lining extending 1 foot above the maximum surface. Transverse expansion joints were placed in the lining at intervals of 20 feet to prevent unsightly cracks. Photograph No. 6 shows a section of lined canal in the vicinity of Payson with check, turnout, and measuring box.

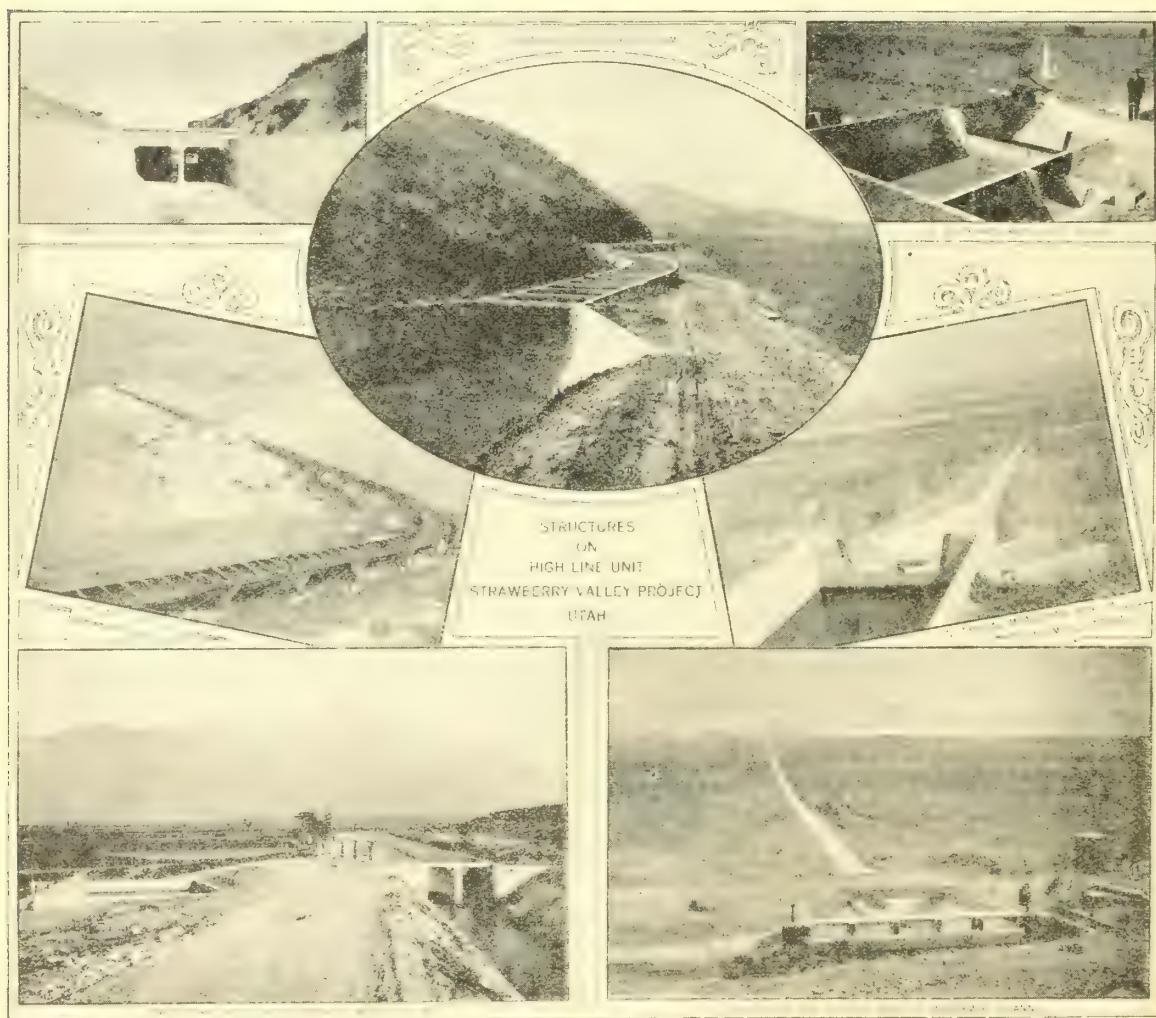
Table 1 is a tabulation of the hydraulic elements of the several earth and concrete-lined canal and flume sections on the main canal.

At a number of deep cuts where very loose gravel and sand were encountered it was necessary to put in special construction in the form of heavily reinforced concrete double-barreled conduits for the purpose of preventing the canal from being filled with

blow sand or material running from the side slopes. Photograph No. 1 shows the portal of one of these double-barreled conduit sections.

Project standard designs were followed in the construction of checks, turnouts, measuring boxes, bridges, and culverts on both the main canal and lateral system. Photograph No. 3 shows three standard measuring boxes with weirs located on one of the turnouts in the main canal at the head of one of the main laterals. The large measuring box in the middle has a capacity of 50 second-feet and the two at the sides 10 second-feet; also there is shown a standard farm crossing a few feet down the lateral.

There is one tunnel 227 feet long located near the upper end of the main canal, and the Peteetneet Canyon, just above Payson, is crossed by means of a reinforced concrete siphon 6 feet in width by 5 feet



6 inches in height, 516 feet in length. This is one of the largest structures on the system. The Los Angeles & Salt Lake and Denver & Rio Grande Railroads are crossed by means of reinforced concrete siphons, and the State road is carried across the canal on a reinforced concrete slab and girder bridge.

Structures on the main canal:

Main high line canal, total length_____miles_	17.5
Lined with 4 inches of reinforced concrete_____miles_	6.6
Flumes and siphons, reinforced concrete, miles_____	1.0
Earth canal_____miles_	9.9
Turnouts (without check)_____	19
Turnouts (with check)_____	15
Road bridges over canal_____	25
Cross culverts and siphons_____	22

TABLE 2.—Hydraulic elements, lateral sections.

Section.	"b" in feet	"d" in feet	"A" in square feet.	"v" in feet.	Slope.	"Q" in feet per second.	"Q" in cubic feet per second.
32-A.....	3.0	0.75	2.82	0.55	0.0488	17.3	49
32-B.....	3.0	1.30	5.60	.84	.0079	9.3	52
32-C.....	3.0	1.10	4.52	.74	.0136	11.3	51
32-D.....	3.0	1.20	5.04	.79	.0100	10.1	51
32-E.....	3.0	1.25	5.32	.82	.0080	9.3	50
32-F.....	3.0	.90	3.52	.64	.02746	14.5	51
32-G.....	3.0	1.50	6.76	.93	.0040	7.1	48
32-H.....	2.0	1.10	3.42	.66	.0075	7.8	27
32-I.....	2.0	.90	2.62	.57	.0140	9.6	25
32-J.....	2.0	1.00	3.00	.62	.00882	7.9	24
32-K.....	2.0	1.20	3.84	.71	.00497	6.5	25
32-L.....	2.0	.70	1.90	.47	.0389	13.9	26
32-M.....	2.0	1.00	3.00	.62	.0112	9.0	27
32-N.....	2.0	1.10	3.42	.66	.0060	6.9	24
32-O.....	2.0	.75	2.07	.50	.0267	12.1	25
32-P.....	2.0	1.20	3.84	.71	.0044	6.3	24
32-Q.....	1.5	.40	.76	.29	.0217	7.2	5.5
32-R.....	1.5	.50	1.00	.34	.0089	5.2	5.2
32-S.....	1.5	.40	.76	.29	.0183	6.7	5.1
32-T.....	1.5	.55	1.13	.37	.0079	5.2	5.9
32-U.....	1.5	.40	.76	.29	.0353	9.2	7.0
32-V.....	1.5	.60	1.26	.39	.0050	4.3	5.4
32-W.....	1.5	.50	1.00	.34	.0100	5.5	5.5

For all sections:  
Side slopes=1:1;  
"n"=0.013.

Structures on the lateral system:

Lateral system, total length_____miles_	71.2
Lined with concrete_____do_____	55.0
Earth section_____do_____	11.3
Miscellaneous structures (siphons, culverts, etc.)_____miles_	2.4
Metal flume_____do_____	2.5
Bridges, culverts_____	124
Bridges_____	32
Turnouts_____	138
Measuring boxes_____	133
Cross drains_____	83
Siphons_____	15

Photograph No. 7 shows the wasteway and one of the laterals used as a wasteway channel at the lower end of the main canal.

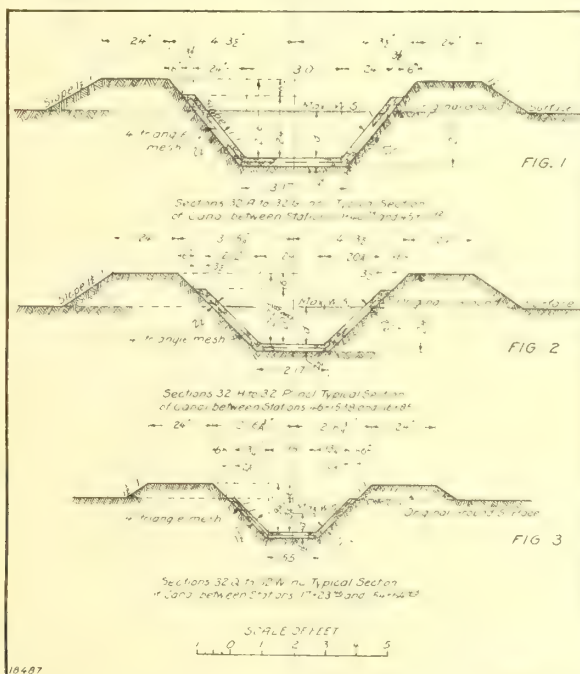
Photograph No. 5 shows a typical measuring box on the small lateral leading down a rather steep slope.

Photograph No. 4 shows one of the long metal flumes.

The construction work on this unit was done during the summer of 1915; the reinforced concrete lining cost 13 cents per square foot and the reinforced concrete structures from \$15 to \$20 per cubic yard.

The system has been in operation for four years and is giving very satisfactory service. The total loss of water from all sources from the head of the main canal to the land, including delivery losses, is about 12½ per cent.

A mean water supply for the lands on the project was decided on after careful measurements and records had been made of the water used on that part of the project which has been irrigated for many years from the Spanish Fork River. This investigation con-



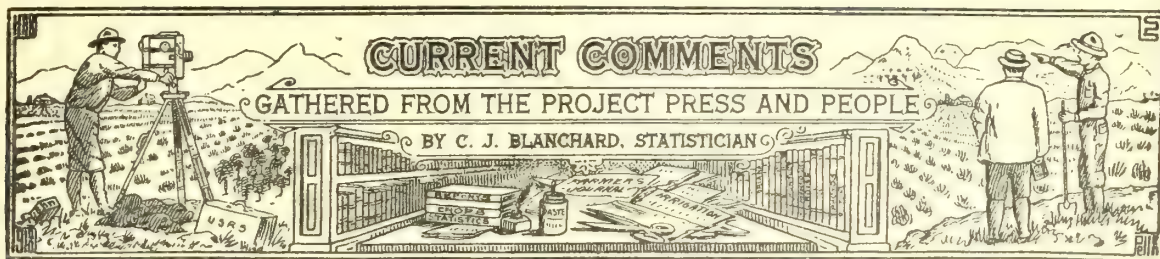
TYPICAL LATERAL CROSS SECTIONS.

**Lateral system.**—Fifty-five miles of the lateral system have been lined with reinforced concrete 2½ inches thick and the greater part of the structures built of reinforced concrete. On the steep slope in the vicinity of West Mountain 2.5 miles of metal flume with wood substructures were built, and the only earth section put in was on flat ground, where the soil was of such a nature that loss by seepage would be very small.

Table 2 is a tabulation of hydraulic elements in the lined sections of the lateral system, and figures 1, 2, and 3 show details of typical cross sections:







The conquest of a great western river and the subjugation of nearly a million acres of desert are subjects of engrossing interest not only to those who dwell in the valley to be redeemed but to every citizen of this country who has pride in its accomplishments. In these days of food shortage and high prices, and the unsatisfied hunger for homes and land on the part of thousands of our people, the initiation of an engineering work of the spectacular nature of the taming of the Snake River, Idaho, makes a powerful appeal.

The initiation of this herculean task has quickened the interest and aroused the enthusiasm of loyal valley folks, and the letters of inquiry from far and wide show that the general public is responsive as well.

In order to give voice and force to the almost universal approval of the people of the unification of the various land and water interests necessary to bring about the fullest and most economical conservation and utilization of the Snake River, and also for the purpose of effecting the coordination of every development organization in the valley, a special meeting was called on May 6, at Paul, Idaho, by Hon. W. C. Larsen, mayor. Delegates representing the financial interests in the principal towns were present and were addressed by Gov. Davis, who directed the meeting and occupied the chair as temporary chairman.

Paul, the "biggest little city in Idaho," was in full civic regalia. Flags and bunting decorated the stores and the local band was very much in evidence. It was a holiday in Paul, and the whole countryside turned out to greet the visitors. The baseball season of 1920 for the Southern Idaho League was auspiciously opened when Gov. Davis, from the pitcher's box, threw a swift ball across the plate amid the vociferous acclaim of a thousand fans.

After the formal banquet given to the guests by Hon. W. C. Larsen, of Paul, the delegates met in the new quarters of the chamber of commerce and proceeded to formally organize the Snake River Valley Community Club.

In his address to the delegates Gov. Davis dwelt at length on the advantage and benefits of the proposed club to the valley and the State and pledged to the club the support of the State. He was followed by the statistician, who explained how the

Service could cooperate with the club in a campaign of publicity and bring a desirable class of people to locate in the valley. Mr. Gignoux, a representative of the Union Pacific and Short Line Railroads, expressed his personal gratification at the formation of this club and pledged the support of the industrial department of the railroads in its work.

Articles of incorporation were drawn up and agreed to. A board of five directors was appointed, with W. C. Larsen as temporary president and J. R. Barta as temporary secretary. The city of Paul was selected as headquarters for the club. As soon as the articles have been returned by the Secretary of State the big drive for memberships will begin.

At the present writing the pledges of assistance from the financial institutions of the valley amount to about \$25,000, and it is expected that by June 1 not less than \$75,000 will be available. Motion films and photographs illustrative of the scenic, agricultural, industrial, and other attractions of the whole valley will be made and assembled, and 30 sets of two reels each of motion films will be prepared for circulation all over the country next winter and spring.

The club will cooperate with the various communities in every worth-while effort for civic improvement. It will concentrate upon the American Falls Dam, and the full force and power of the club will be brought to bear to expedite the work. The club is to be a clearing house between the industrial departments of the railroads and valley towns, between the Reclamation Service and the thousands of settlers who will seek to locate here. It will be prepared to furnish information and advice concerning the whole valley and will conduct in the various parts of the country an aggressive educational campaign with the aid of competent lecturers, assisted by films and slides.

A campaign of this kind with the great publicity given by the circulation of 60 reels of Government films in all parts of the United States can not fail to make the Snake River Valley one of the best-known sections of the West.

To-day this wonderful valley, developed at a pace unbelievably rapid to those who do not see it yearly, is seldom visited by the transcontinental traveler. With the widespread publicity soon to be given it these travelers will make it a point to take advantage



of stop-overs. The auto tourist will make sure that his itinerary covers a part of the valley, at least, in his cross-country trip.

Who is then daring enough to predict the full measure of benefit which will flow out of these activities of the club? From the foothills of the lofty Tetons to the broad expanses of the reclaimed land of the Twin Falls country stretches the splendid valley of the Snake River.

Its people, once organized, united, and wisely directed, will become the greatest force for progress and material welfare in the valley and the State. Concentrate such a force upon the American Falls Dam, the Bruneau project, or any one of the dozen large enterprises awaiting development, and all obstacles can be overcome with ease.

#### NOTED HERE AND THERE.

*Arizona Salt River project.*—What is believed to be the highest price ever paid for a piece of desert land was recorded a short time ago when W. H. Stowe sold 320 acres of land on the desert for a total of \$36,000.

One piece of 160 acres, which contains a fine pumping plant and 100 acres in cotton, was purchased by Messrs. James and Morgareidge for \$125 per acre. The place contains a house and is fenced. The renter last year took \$12,000 worth of crops off the place.

The other 160 acres was bought by the Pomeroy Realty Co., of Mesa, for \$100 an acre. This quarter section was purchased by Mr. Stowe about a year ago for \$35 an acre.

Mr. Pincham sold his ranch, formerly the Knudsen place, the other day to Mr. Willis, of Snowflake, for \$525 an acre. Three days later Mr. Willis sold it to Mr. Watkins for \$575 an acre, and a few hours after he had bought it Mr. Watkins refused \$600 an acre for the 40.

*Colorado, Grand Valley project.*—The Garmesa sale, much advertised, has proved the power of advertising in no uncertain way. It was the biggest sale ever pulled off in western Colorado.

Six head of fine milking-age stock, heifers and cows, averaged \$443 each, a very fine figure, considering some of them were small, young stock. All the females, 15 in number, averaged \$325 per head. Some of these were a month old, others two months, so the average is a splendid tribute to their great worth.

The five bulls sold at an average of \$228, and the biggest bull in the herd, King Segis Pontiac Garmesa, weighing about 2,700 pounds, sold to Jay Smith, of Collbran, for \$525, the top mark for males. The top price for females was Piebe, a splendid animal, which sold for \$620, the top price for any animal sold. Her 2-year-old daughter, Garmesa Piebe Homestead, sold for \$525, and also went to Jay Smith, who is now raising cattle in the Collbran section.

The cattle sales were followed by the hog sales. Some of the stock not held as particular favorites by the Garmesa farms sold for \$80 and \$90 per head, and then when the snow began some of the choicest of the herd were sold for \$35 and \$40 and \$50, extreme bargains.

The controlling interest of stock in the Grand Valley Canning Co., located at Appleton, formerly held by Theodore and Thomas Scott and N. N. Cottingham, has been purchased by Henry Monheim, T. R. Holland, and J. A. Lapp, all prominent citizens of the Appleton district.

The new organization of the Grand Valley Canning Co. plans extensive improvements with increased production as the object.

The company decided at its meeting to contract this year for 125 acres of tomatoes and to buy apples to the extent of their working capacity.

Sufficient improvements will be made to handle a maximum production this year, with a major portion of improvements, including possible additions to the building, to be completed in time for next season's crops.

*Colorado, Uncompahgre project.*—From November 10, 1919, to March 6, 1920, the Olathe Cooperative Hog Shipping Association had shipped over \$25,000 worth of stock, nearly all of which was hogs. The association now has about 70 paid-up members. At a recent meeting of the board of directors it was decided that the association should carry its own insurance against losses in transit by the payment into an insurance fund of a small premium for each animal shipped, instead of paying the premium to an insurance company, as has been done heretofore. Anyone having a few hogs or cattle to sell will do well to get in touch with the manager of this association, unless there is an association closer to him.

*Montana, Sun River project.*—During the past year the Phillips County Marketing Association shipped 510 head of cattle, 50 head of hogs, and 191 head of sheep for 140 farmers of the county, at a conservatively estimated saving of \$6,000. The above facts are shown in the annual report of the secretary-treasurer, which was read at the meeting held at Malta.

Although the association is only two years old, its work has proven conclusively that cooperative livestock marketing means a saving of dollars and cents to the farmer who sells but a few head of animals each year. Farmers of the county are rapidly awakening to the importance of this work, and with the results secured during the past two years it is safe to say the system is on a sound basis in the county.

*Montana-North Dakota, Lower Yellowstone project.*—Two large land sales were made last month by H. E. Meisenbach, of the Sidney Land & Loan Co.,

when the Peter M. Anderson farm, adjoining Sidney, and the Holger Peterson farm, formerly owned by Peter Anderson, sr., were sold to Wyoming purchasers. The total consideration amounted to \$75,000, which shows that outsiders have unbounded faith in the productivity of the irrigated lands in the wonderful Lower Yellowstone Valley.

Mr. Anderson will retain possession of his farm during the coming season and gives possession the early part of next year. The other farm will probably be occupied by a tenant this year until the new owner can take personal charge.

Mr. Anderson purchased the land 15 years ago for \$1.75 per acre, together with another half section, and in disposing of the entire section he has realized over \$46,000, the original investment being a little over \$1,100. He is one of the valley's most progressive farmers and has one of the finest farms in this vicinity with up-to-date improvements, and the fact that it adjoins the townsite of Sidney adds materially to its value.

*Nebraska-Wyoming, North Platte project.*—Scottsbluff, Nebr., population 6,912, holds the record for the fastest growth of any city in the United States, so far announced by the Census Bureau. Scottsbluff grew at the rate of 295.5 per cent during the official census decade, 1910-1920, according to the bureau.

In 1910 Scottsbluff had a population of 1,746. Then the United States chose it as the center of a big irrigation project, with the result that a small city found itself the center of a thriving beet-sugar growing community.

*New Mexico-Texas-Rio Grande project.*—The annual meeting of the Mesilla Valley Dairy Association was held recently, with a large representation from all parts of the valley, about 70 members being in attendance.

The past year proved to be the most prosperous in the history of the organization. The total sales amounted to \$177,527.74, of which milk represented \$141,399.85 of the total. New property was purchased at an expense of about \$17,000, of which over \$7,000 was paid the past year. A dividend of 12 per cent was declared on the capital stock and it was also announced at the meeting that \$6,000 worth of additional stock had been sold the past year, all to dairymen in the valley.

The Mesilla Valley Dairy Association is proving itself to be one of the most solidly established and prosperous organizations of the Rio Grande Valley.

*South Dakota-Belle Fourche project.*—Newell has outgrown the name of town and is now a city, and the next annual election of officers will be under this plan. Instead of a town board of trustees, the city will elect a mayor, two aldermen from each of the four wards and two justices; also the title of the town scribe will be changed to city auditor. Not so

bad. Some towns do it faster, but not so well. And for a 10-year-old Newell isn't so far behind as one might think.

*Washington, Okanogan project.*—A modernly equipped sawmill of 30,000 feet daily capacity is the latest addition to Omak's industrial center.

Manager O. M. Forkel, of the Omak Warehouse & Storage Co., returned home from the coast recently, where he had been to make the necessary purchases of machinery at Seattle and Portland.

This is the first band-saw, steam-equipped sawmill to hit this part of the State. This plant is located next to the plant of the Omak Box Manufacturing Co., and as the majority of its output will be made into boxes, it will be an endless-chain system from log to box shook, with steam doing all of the heavy work.

*Washington, Yakima project.*—Dick Klassen recently sold his 40-acre ranch to Mr. Alderman, realizing a profit of \$100 an acre on the land. The ranch is located near Outlook, and Mr. Klassen had owned it for only four months. Surely some of the Yakima Valley farmers have touched finger tips with Get-Rich-Quick Wallingford at least once in their lives.

Behold, how the lowly shall be exalted!

But a few years ago the humble prune was the boarding-house keeper's stand-by; now it has become elevated to a luxury of the first rank. And with its rise in the world there has been a corresponding increase in its cost, so that now a number of Yakima Valley orchardists are planting prune trees.

Peter J. Eschbach is one of the valley men who believes that the prune will be a financially profitable crop for years to come. He has planted a 30-acre ranch in the Lower Naches to prunes, putting in 3,000 trees. In many of the orchards throughout the valley apples not of commercial varieties are being pulled up and prunes substituted.

*Wyoming, Shoshone project.*—The sugar-beet acreage contracted with Field Agent Hammond is now practically three times the amount of land put into beets a year ago. Last season 505 acres were put into beets in all the Power Valley country, and 120 acres of beets were grown at Cody, making a total for the Powell and Cody sections of 625 acres. There are now approximately 1,800 acres of beets contracted for in the same territory—nearly three times the acreage of last season.

There may be a question as to who is the biggest sweet-clover seed producer in the county, but when it comes to producing the most sweet clover off a given space of ground, Elias Johnson, of Lovell, so far, according to our information, holds the record. Mr. Johnson raised over 1,000 pounds of yellow-blossom sweet-clover seed on less than an acre of ground.—C. J. B.

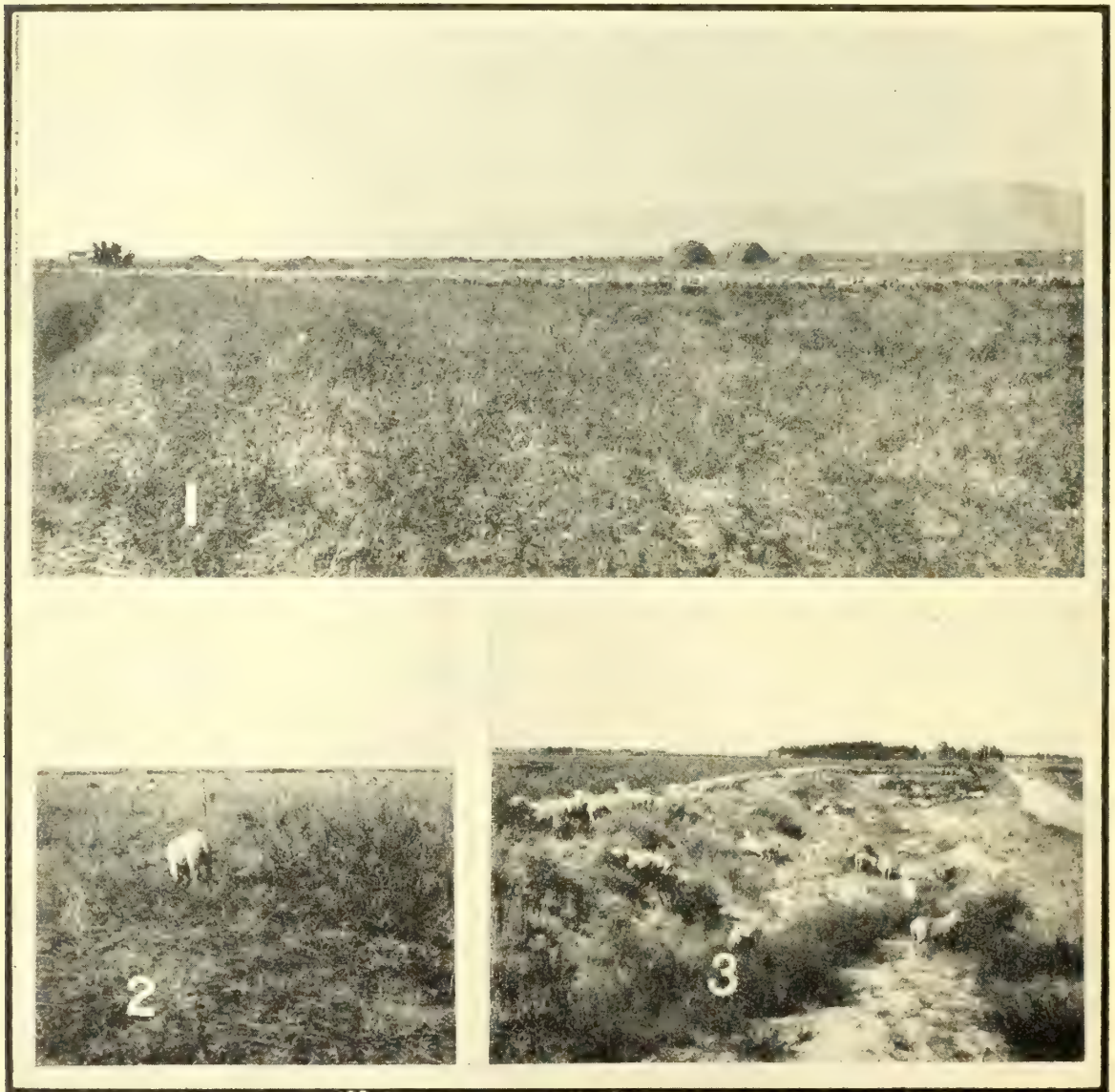


### UTILIZING WASTE PLACES AND PRODUCTS.

Prepared by the United States Department of Agriculture.

In these times of high prices and acute scarcity of farm labor there is a strong inclination to focus attention on the most pressing field work and let the edges, corners, and by-products take care of themselves. There are a good many edges and corners on an irrigated farm, and if left unregarded they may quickly become not only unsightly but a source of additional trouble and labor. There are many by-products which the irrigation farmer, as well as all others, fails to utilize and unnecessary losses are the result.

In fact, the misuse of the by-products of farm crops is causing American farmers to lose millions of dollars annually. Nothing offers greater opportunity for increased and more economical production of farm meats and dairy products than the more effective use of such products. To bring farming operations up to the highest possible state of efficiency all farm by-products must be used in an economical manner. Nearly all managers of the great industries of this country have learned that by-products constitute a very large source



1. Band of sheep foraging grain stubble. This practice is followed by nearly all the large sheepmen who run their bands on the range during the spring and summer. 2. Range sheep grazing on sweet clover and other waste feeds. 3. Sheep grazing on ditch banks which grow sweet clover and other clovers and weeds

of their income and about all the profits. Farming is the greatest industry in this country to-day, but farm by-products have received very little attention from the average farmer. Every farmer should make a study of conditions existing on his own farm with the idea of utilizing such products as are now being wasted.

It is estimated, for example, that the total amount of corn stover and straws burned, plowed under, allowed to rot in stacks, and wasted in other ways in this country is worth over \$100,000,000. If these feedstuffs were used in the feeding of cattle, sheep, and horses it would result in greatly increased profits to individual farmers as well as tend to increase the supply of meat and dairy products.

It takes time and labor to keep ditch banks clean—to refer to a particular problem of the irrigation farmer—but it may take even more time and labor to get the water through or repair breaks at a critical time in the rush of irrigating a crop, if the weeds have hidden an obstruction in the channel or a hole in the bank.

It is a practical problem, deserving careful thought, to plan ways of keeping down the weeds on these waste places, not only to the end of saving labor, but also to save feed. There is little satisfaction in working hard in the hot sun to make alfalfa hay to feed to stock that might better have been foraging over waste lands.

Many ditch banks and roadways can be kept in grass almost as easily as they can be left to produce rank and relatively useless weeds. And once well covered with grass it is not difficult to arrange a means of using such areas for pasture. In many cases such pasturing actually saves work as well as feed.

The irrigation farmer should remember that not all the profits in farming are made from the open fields. Often the proportion of the farm not well utilized is surprisingly large. Interest and taxes run against all the land, and if only 80 per cent of it is producing, that part must carry the heavier burden in consequence. But it is not only the utilization of waste places that is important. Each crop has its by-products, its stubble, stover, or aftermath that ought not to go to waste. Too often valuable feed is allowed to rot, burn, or wither because the means for making use of it are not at hand.

It is in the timely saving of by-products and the use of otherwise waste places that live stock may often find strong justification on the farm. In this sheep, hogs, and horses are all useful. The sheep, particularly, is a very efficient animal in utilizing certain waste products on the irrigated farm. There is much waste feed, including weeds and native grasses on ditch banks and in fence rows, the waste hay and aftermath in hayfields, grain and weeds in stubble fields, and the beet tops left after

the sugar-beet harvest. As the growth of the irrigated pasture crops begins to diminish, these waste materials become available, so that the sheep are gradually moved from the pastures to the fields, ditch banks, etc., where, in ordinary seasons, they are well fed until late in the fall. The sheep oftentimes can be used for temporary periods in summer in cleaning up weeds from ditch banks and other similar places on and about the farm. By these methods the sheep assist in keeping down undesirable vegetative growth and in removing waste material, at the time producing valuable mutton and wool.

These are but a few suggestions of the unnecessary losses from which the irrigation farmer may suffer. There are many others which should be searched out and eliminated. As agriculture is becoming more and more efficient and specialized, loose methods and wasteful practices exact an increasingly heavy penalty from the farmer. The United States Department of Agriculture, through its experts in irrigation farming, will be glad to give help to any inquirer desirous of information on any special problem. Address United States Department of Agriculture, Washington, D. C.

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### BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture,  
Washington, D. C.

#### FARMERS' BULLETINS.

No. 1084. *Control of American foul brood.*—This is a disease of the brood of bees which is causing great losses to American beekeepers. It is important that the beekeeper should know whether American foul brood or European foul brood is in his apiary, for the two do not respond to the same treatment. The facts about the disease on which the treatment is based are discussed in this illustrated bulletin and the treatment is described in full.

No. 1096. *Frost and the prevention of damage by it.*—This illustrated bulletin describes the changes that take place at and near the earth's surface on a frosty night, so that persons protecting plants and trees may be able to understand how their protective devices operate to prevent damage and in what manner they are most efficient. It also discusses the various methods and devices now being used for protection against frost, including a chapter on temperatures injurious to plants, blossoms, and fruit.

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It is becoming more and more evident that it is the poorest kind of economy for a dairyman to make use of a cheap scrub bull.



## TULE LAKE RECLAMATION, KLAMATH PROJECT.

By Herbert D. Newell, Project Manager, U. S. R. S.

The reclamation of the bed of Tule Lake has been an important feature of the Klamath project from its inception. When investigations were being made and the earlier plans formulated, the lake covered an area of about 150 square miles. It was located on the boundary between Oregon and California, about 140 miles from the Pacific Ocean. Fully 90 per cent of the lake bed was in California.

The maximum water-surface elevation of the lake of which we have definite record was 4060 and occurred in 1907. At that elevation the lake had an area of slightly more than 154 square miles. The bottom of the lake is at elevation 4030, so the maximum water depth has been 30 feet. The storage at water surface elevation 4060 is 2,080,000 acre-feet.

Tule Lake has no visible outlet. It has been subject to marked fluctuations in area. About 1850 an old emigrant trail followed along the northeasterly shore of the lake and crossed Lost River at a ford on a sandstone ledge, sometimes called the natural bridge. In 1862, after a hard winter, an early settler made a horseback trip along the northerly shore of the lake and on account of high water was compelled to follow the foothills, which indicates that the water surface elevation may then have been considerably higher than 4060. At that time the emigrant trail must have been submerged about 20 feet. Other pronounced fluctuations are known to have occurred but accurate records do not exist prior to 1904. The sandstone ledge did not appear again until 1918.

Tule Lake is fed by Lost River, which has a drainage area of 1,420 square miles. The marginal lands draining directly to the lake cover an area of 180 square miles. Adding to the foregoing the 150 square miles in the lake itself, it follows that the problem of Tule Lake reclamation involves the impounding, diversion, or disposal otherwise of the run-off from 1,750 square miles.

The average annual precipitation at Klamath Falls, based on a 15-year record, is 12.8 inches. The elevation of Klamath Falls is about 4,100 feet; that of the major portion of the drainage area in question is somewhat higher. There is little evidence that there is any marked variation in precipitation from that at Klamath Falls.

During 1904-5, a year of low run-off, Lost River discharged 167,000 acre-feet into Tule Lake. The following year 324,000 acre-feet were discharged. During 1906-7, a year of large run-off, 427,000 acre-feet passed from the river to the lake. The average annual discharge of three successive years was 306,000 acre-feet. If to the foregoing, one adds the estimated run-off from the marginal area of 180 square miles and the rainfall on the lake surface, then in 1907 the

problem of lake reclamation involved the disposal of an average annual accretion of about 450,000 acre-feet plus an accumulated storage of 2,080,000 acre-feet.

It is not feasible to drain the lake by an open cut. The deepest part is near the south shore, which borders on the Modoc lava beds. These rise rather abruptly from the high-water line to an elevation of 20 feet or more, and extend many miles to the south. The nearest drainage channels which could serve as a direct outlet are Fall River and Pitt River, distant fully 34 miles in an air line from the nearest part of Tule Lake. The lowest summit of the intervening high land is 4,209, or about 180 feet above the lake bed.

The lava beds form an exceedingly rough country, covering hundreds of square miles. In many places the lava flow crusted over and afterwards the crust caved in, leaving holes 50 to 200 feet in diameter by 30 to 40 feet deep, the bottom being masses of loose lava rock. There are many cracks 10 feet to 20 feet wide and several miles long, also innumerable small cracks and caves filled wholly or in part with loose rock and coarse cinders. Several caves of considerable size are known to exist. One, known as the ice cave, contains large accumulations of ice and has considerable local celebrity. It was in this rough, difficult country that the Modoc Indians made their fight in 1872-73. Their leader, Capt. Jack, had his stronghold close to the southwest corner of Tule Lake.

There has been a persistent rumor that Tule Lake formerly had a subterranean outlet, which gradually became filled with debris and silt. Those expressing such a belief point to the extremely low stage of the lake when the emigrant trail was established and to the fact that the water in the lake is fresh. Different persons have claimed to know fairly closely the location of the former outlet. From time to time proposals are received offering, for a suitable retainer in advance, to divulge plans for the cheap drainage of the lake.

The possibility that the lake had and may have a subterranean outlet has been given some consideration. The fissured character of the lava beds and the existence of fresh water in the lake give color to such a belief. Moreover, such copious springs crop out along Fall River and Pitt River, distant about 50 miles south, and some 600 feet lower, that the possibility of underground connection is strongly suggested. Further, when the lake was at its higher stages the water surface was against the fissured lava and flow into the rock could be observed.

In the latter part of 1907 local parties made a small excavation at the southeast corner of the lake.

A flow of about 1 second-foot took place from the lake into the fissured rocks. During 1908 some work was done by the Reclamation Service enlarging the excavation. A trench fully 70 feet long, 20 feet wide, and 15 feet deep was excavated. Between April 13 and June 26, 1908, there was a fairly constant flow from the lake into the rocks of 13 second-feet. In December, 1908, the discharge was 30 second-feet, which continued into July, 1909, by which time a recorded discharge of fully 15,000 acre-feet had taken place. Gradually, however, the discharge into the rocks became less and finally practically ceased, due, apparently, to the crevices becoming sealed. Eventually the lake receded from the edge of the excavation.

During 1915 some exploring was done with drills at the southerly margin of the lake. Also certain experiments were made pumping water from the lake into the fissured lava. The results of these investigations were inconclusive. They indicated, however, that the feasibility of disposing of any considerable quantity of water by pumping into the fissured lava or by gravity was very uncertain.

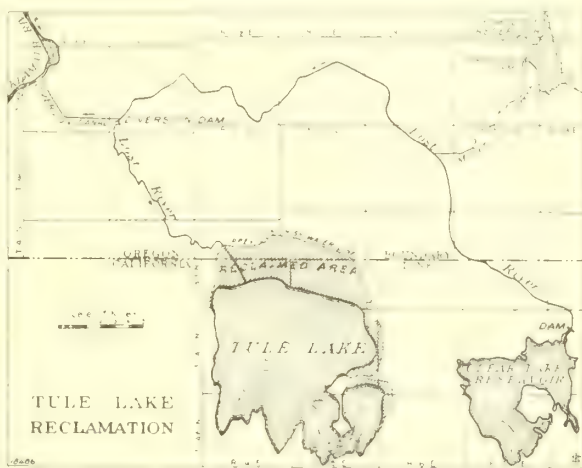
Since Tule Lake has no known outlet, the problem of reclamation became essentially one of withholding inflow as much as possible, thus permitting the excess of evaporation over inflow to deplete the lake. The best information at hand indicated that the average evaporation at Tule Lake was close to 3.8 feet annually. There is a good storage site on Willow Creek and one on Miller Creek, the two main feeders of Lost River. The site on Willow Creek is at Clear Lake and that on Miller Creek at Horsely, both sites being shown on the accompanying map. It also appeared feasible to divert all of the low-water flow of Lost River into Klamath River by means of a canal.

A glance at the map will show that Lost River heads in Clear Lake, which is distant only 6 miles from Tule Lake, into which it finally empties, after a course of about 70 miles. Clear Lake is in part natural and in part artificial. It originally covered about 10,000 acres and was surrounded by a marshy area of about the same extent. During 1909-10 the United States constructed a dam at the outlet of the lake with spillway crest 24 feet above the former lake level. The area of the lake, with water at the spillway crest, is 25,000 acres; its storage is 462,000 acre-feet. The dam is of rock-fill type with a riprapped earth embankment on the water face. In addition to the dam, a comparatively low dike was required to close a gap on the opposite side of the reservoir. The total cost of the dam, dike, and reservoir was \$333,000.

Clear Lake Reservoir was completed in January, 1910. Since that date the gates have been closed with the exception that an estimated quantity of about

5,000 acre-feet has been discharged annually from the reservoir for irrigation and stock water in Langell Valley. The average annual inflow from January, 1910, to January, 1920, has been 117,000 acre-feet. The water surface has never quite reached the spillway crest although it only lacked two-tenths of a foot in May, 1917. Had 1917 been followed by a year of average run-off, then it is probable that there would have been an appreciable flow over the spillway. Unless a considerable part of the water impounded is used for irrigation, it is likely that a succession of wet years will occur sooner or later, in which case water will pass over the spillway.

A careful study indicates that Clear Lake will afford a generally dependable water supply for fully 17,000 acres. The Langell Valley irrigation district is located on both sides of Lost River and covers about 30,000 acres. The upper end of the district is



distant about 10 miles from Clear Lake Dam. There is pending a contract between the district and the United States whereby the district will acquire a water right for \$10 per acre. Should Langell Valley perfect a water right from Clear Lake, then none of the flood flow of Willow Creek will enter Tule Lake.

In order to divert from Tule Lake all but the flood flow of Lost River, a U-shaped inclined multiple arch concrete diversion dam 25 feet high has been built, and a canal 8 miles long discharging into Klamath River. The designed capacity of the canal was 250 second-feet; actually it has carried as much as 450 second-feet. The diversion canal was completed in June, 1912. Since that date it has diverted to Klamath River 580,000 acre-feet, or a yearly average of 72,800 acre-feet, nearly all of which would otherwise have entered Tule Lake. The total cost of the diversion dam was \$172,000; that of the diversion canal \$138,000, rights of way included. Flood run-off greater than the capacity of the canal has per-



mitted a total of 455,000 acre-feet to reach the lake. The maximum quantity to flow into the lake in one year was 121,000 acre-feet; the average for the period has been 57,000 acre-feet annually.

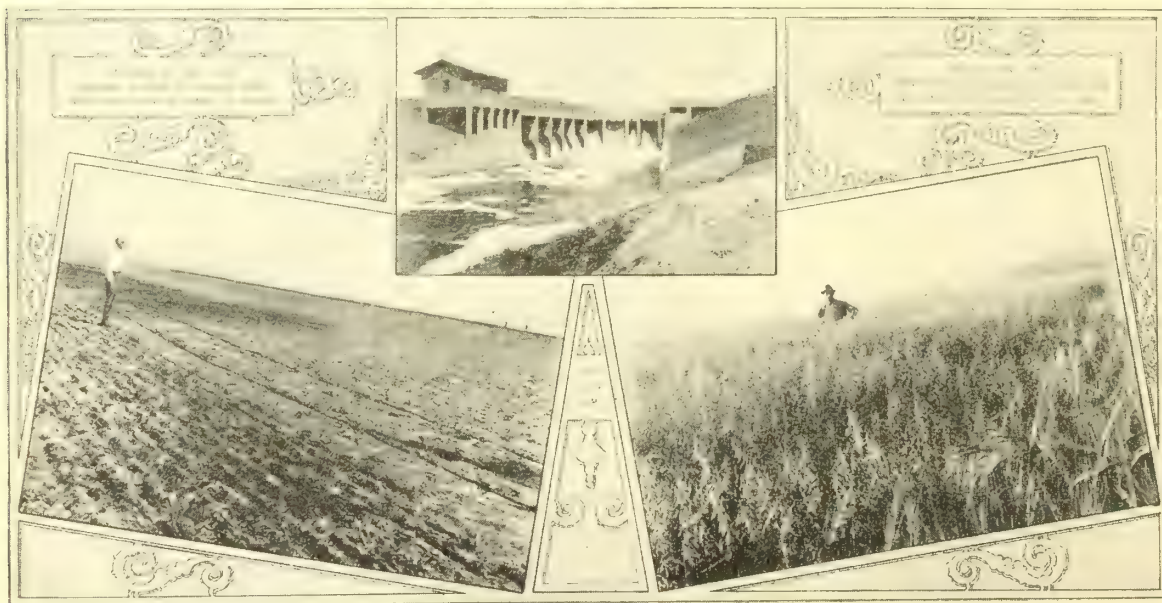
The results from building Clear Lake Reservoir, the diversion dam, and canal, aided somewhat by several years of less than normal rainfall, have been the lowering of the water surface of Tule Lake 15 feet in 7½ years. The area of the lake has been reduced from 98,600 acres in June, 1907, to 68,600 acres in the fall of 1919. Within the same period the storage has decreased from 2,080,000 acre-feet to 320,000 acre-feet. Of the area made bare fully 20,000 acres are good agricultural land, 6,000 acres of which are now in cultivation. The remaining 14,000 acres are public land which can be thrown open to entry whenever water for irrigation can be made available. It will require the expenditure of considerable money and at least one full season's work to bring water to the land, so it is not likely to be opened prior to the spring of 1922. By that time the area made bare should be fully 40,000 acres.

The 6,000 acres of Tule Lake land were opened in 1917 subject to a building charge of \$39 and \$45 per acre. They have now been settled three years and development has been satisfactory. During 1919 the better-farmed tracts yielded up to 5 tons of alfalfa per acre. They are valued at about \$125 per acre, the purchaser assuming the unpaid water right. Unirrigated lands close to the edge of Tule Lake yield

excellent crops of grain and are in great demand. During 1919 one 80-acre tract yielded more than 6,000 bushels of grain, the total gross value of which was close to \$8,000. This tract was not irrigated, and the only work required was to sow the seed in the spring and harvest the crop in the fall. Recently bids were opened for leasing about 8,400 acres. Substantially the entire area was leased, the maximum price bid being \$13.26 per acre and the average price \$4.50.

If Horsefly Reservoir is not built and pending plans for the development of land on Upper Lost River carried out, the area which will be made bare since 1907 will total about 45,000 acres. The area of the lake will vary from 50,000 acres, corresponding to a water-surface elevation of 4,037, following a year of large run-off, to 25,000 acres, corresponding to a water surface of 4,034, which might result from a succession of dry years. In other words, without Horsefly, after 1923 or 1924, the lake is likely to fluctuate between elevations of 4,034 and 4,037, which will leave a zone of about 25,000 acres unfit for permanent development, unless the water surface is artificially controlled by dyking and pumping.

If Horsefly Reservoir is built with storage in excess of 90,000 acre-feet and the water used for the complete irrigation of land on Upper Lost River, then the run-off of Miller Creek will be largely controlled and only at rare intervals will any considerable flood run-off enter Tule Lake. Accretions to the lake will then be



THE TRANSFORMATION OF A FORMER LAKE BED.

limited to the flood run-off of Lost River in excess of the capacity of the diversion canal originating below Clear Lake and Horsefly Reservoir, return flow originating below the present diversion dam, rainfall in the lake itself, and the run-off from the marginal drainage area. Under these conditions the lake will become a sump of fluctuating area with a probable average water-surface elevation of about 4,035, corresponding to a sump area of around 30,000 acres. There will

probably be a border zone of many thousand acres suitable only for pasture. By pumping from the sump it may prove feasible to entirely unwater the lake most years. However, years are likely to occur when extreme floods will cause a greater flow to the sump than an economical pumping installation can handle, in which event for considerable periods the bottom of the sump might not be suitable for crops.

## LIVE-STOCK INDUSTRIES ON THE UNCOMPAHGRE PROJECT.

By H. A. Ireland, Agriculturist.

Much interest is manifested on the Uncompahgre project, Colorado, in all lines of stock raising, and with the establishment of beet-sugar factories in the valley this interest will be further stimulated by the production of valuable, cheap feeds in the form of beet pulp and molasses.

Cattle raising is the oldest and best developed of the live-stock industries, its beginning being coincident with the settlement of the valley by the white man. Over 11,400 cattle were reported by project farmers in 1919. The range stock finds excellent summer pasture in the national forests and on the public domain and are fattened on the alfalfa grown on the irrigated farms of the valley with the addition of silage or other supplementary feeds, or are sold and shipped as feeders. These cattle furnish the largest market for the hay grown in the valley. The continued use of good bulls is effecting much improvement in many of the herds.

Dairying is an important industry on the project. Over 3,700 dairy cattle are owned by project farmers, the greater part of these being of the Holstein breed. There are several pure-bred herds of this breed, containing some of the best blood of the breed, and herds of high-grade cows of merit with pure-bred bulls at their head are common. Other breeds are represented in a smaller way. Local creameries and other factories furnish a convenient market for the products of the industry. Silos in connection with dairy farms are becoming the rule rather than the exception. Irrigated pastures for dairy stock are needed and are coming into favor.

Hog raising has been profitable, the valley climate and feeds being well adapted to the industry. With the rich alfalfa pastures hogs can be grown at a profit even when other feeds are scarce or high in price; 11,432 hogs were reported on the project in 1919. The Duroc-Jersey breed predominates, but there are a number of very good herds of Poland Chinas and Berkshires. Most of the hogs sent out of the valley are sold and shipped through cooperative shipping associations, which have resulted in materially in-

creasing the profits of the grower and keeping up his interest in the industry.

Sheep raising is increasing in a substantial way, many small flocks being seen on farms where formerly no sheep were kept. The greater part of the sheep on the project are of mixed breeding, coming from the large range flocks, but there are numerous pure-bred flocks, and the use of pure-bred rams is showing its influence in the improvement of all farm sheep. Co-operative effort among sheep owners in marketing their wool and mutton is beginning to take form and promises as much for the industry as shipping associations have done for the hog raisers.

The prospects for the continued growth and development of live-stock industries of all kinds seem good. The need is for better stock of all classes, and with the general interest in the use of the best sires obtainable needed improvement is bound to come.

## MAKING GARDEN WORK MORE EASY.

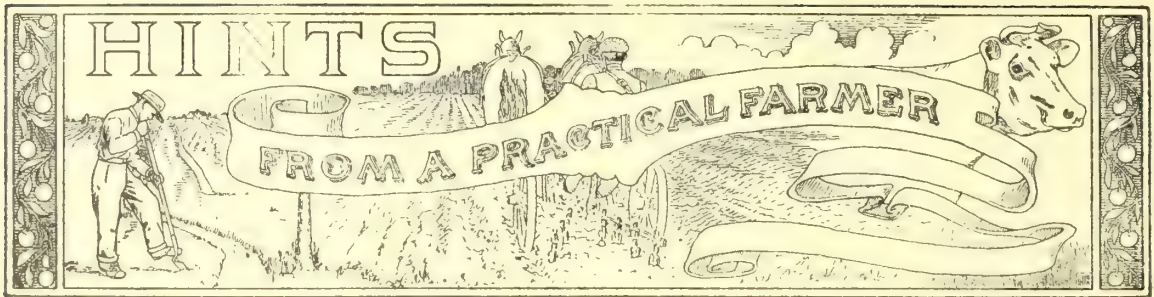
One of our readers who signs himself "A farmer on the Uncompahgre project" sends us the following suggestion:

"I note your article in the April number of the RECLAMATION RECORD relative to making garden work more easy, but not giving definite methods of doing so. The following method has proven very satisfactory:

"When garden space is prepared, mark out with standard marker. Plant seeds or set out plants close to marks. After watering, and plants are growing, use either one or two horse cultivator and re-mark, throwing plants in center of row. It is little trouble to cultivate with spud cultivator each time you are ready to cultivate spud field."

Good roads are essential to the prosperity and well being of urban and rural communities alike. They are prerequisite for the orderly and systematic marketing of farm products, for the establishment of satisfactory rural schools, and for the development of a richer and more attractive rural life.





### Making a Profit in the Farming Business.

The profitableness of the farm business depends upon three things—ample production, minimum cost of production, and adequate prices. Adequate production at minimum cost involves more efficient methods and economical operations. Factors in this are better utilization of the soil, more intelligent use of fertilizers, the use of better seed, the growing of more productive strains and varieties, better methods of preventing soil erosion, more effective methods of combating insect pests, plant and animal diseases, the production of more and better grades of live stock, better utilization of forage and roughage and waste materials on the farm, better maintenance of soil fertility by conserving soil moisture and manure and a greater use of legumes in rotations and as companion or inter-tilled crops, the greater use of machinery and practical mechanical power on farms.

The problem of securing for the farmer prices which will enable him to maintain production is a more difficult one. Attention must be given to better and more economical methods of grading, storing, marketing, and distributing farm products.—*From an address by Hon. E. T. Meredith, Secretary of Agriculture.*

### Barnyard Manure a Valuable Product.

Farm manure is one of the very valuable products of the farm. A 5-ton application yearly for a short period produced 2 tons of sugar beets for a ton of manure, according to the results of several years' experimental work conducted by Dr. F. S. Harris, director and agronomist of the Utah Experiment Station, at the station's irrigated farm at Logan and dry farm at Nephi.

Manure applied to sugar beets at the rate of 10 tons to the acre gave an increase in yield of about 1 ton of beets for each ton of manure. Five tons to the acre gave nearly 2 tons of beets for each ton of manure, but where as much as 40 tons to the acre were applied the increase was only about four-tenths of a ton.

Where potatoes were manured at the rate of 5 tons to the acre the yield was increased by nearly 13

bushels for each ton of manure, but where 40 tons were applied the increase was only 4.3 bushels for each ton of manure.

Experiments were also conducted with wheat, oats, and corn under irrigation and with wheat under dry-farm conditions, all of which showed a distinct beneficial effect, but the use of manure on expensive crops, such as sugar beets and potatoes, gave a higher return for each ton of manure than when applied to wheat and oats.

Dr. Harris says that the soils of Utah have been considered unusually fertile, and as a result the proper use of manure has been delayed, as in all new countries. In regions of intensive agriculture considerable demand has developed for manure, but most farmers have no very definite idea as to just what the value of the manure is. It was to get definite information on the response of Utah soils to farm manure that the experiments were conducted.

This material is now being published as Bulletin 172 of the Utah Experiment Station, Logan, Utah, entitled "The Value of Barnyard Manure on Utah Soils."

### Helen Makes Good on Roughage Alone.

When Helen Uilkje Calamity (145857) was switched from a grain to a purely roughage ration it was thought that she might object to this change of diet and drop off in milk production, but she didn't. In fact, this cow actually increased her flow of milk, and surpassed any of her previous years' production records by more than 2,400 pounds of milk.

Helen, who comes of a good old family, and is a granddaughter of Homestead Girl De Kol-Sarcastic Lad, was sent by the Dairy Division of the United States Department of Agriculture from Beltsville, Md., to Huntley, Mont., in May, 1918. When she freshened on June 21 it was decided to run her on a semiofficial yearly test without any grain in her ration.

#### NO GRAIN IN THE RATION.

Her ration consisted entirely of alfalfa hay, silage, and pasture, and she was milked three times a day.

The alfalfa hay was of fine quality, and most of the silage was corn silage, although she received a little sunflower silage in December, January, and February. The pasture was an irrigated, tame-grass mixture, and was of good quality.

At 4 years of age Helen had produced at Beltsville 11,476.6 pounds of milk, 382.05 pounds of butterfat, on two daily milkings and a grain, hay, and silage ration. Again at 6 years of age she produced 11,778.2 pounds of milk, 388.39 pounds of fat, on two milkings and a grain, hay, and silage ration. She was 8 years and 3 months old when the test on roughage alone began, and her production for a year on that feed was 14,210.1 pounds of milk and 470.24 pounds of fat.

#### TRYING FOR A HIGHER RECORD.

Helen is now being run on a second test, three milkings a day, with the same roughage, but with a grain mixture in addition. She has milked as high as 91 pounds a day, and promises to increase considerably her record made on roughage alone. The Dairy Division, in cooperation with the Montana Experiment Station, will run other cows on roughage alone, and also on roughage and grain, at the Huntley experiment farm to ascertain the maximum producing ability of good cows when they are fed on good roughage only, with access to pasture, and also when they are given grain in addition to the roughage and pasture.

#### More Eggs—Meat Scraps.

Hens given meat, fish, or milk products in their diet will lay from 38 to 66 per cent more eggs than those which have only grain food and what bugs and worms they can pick up on free range, recent experiments made by the United States Department of Agriculture show.

The birds used in the experiments were given conditions as nearly like those on a normal farm as possible. The experiments were repeated under different conditions and in different years to avoid, as far as possible, any error due to the varied characteristics of the birds.

The average farmer feeds very little meat, fish, or animal protein feed of any kind to his poultry, and consequently gets few eggs during the late fall and winter when eggs are selling at the highest prices.

In the experiments conducted on the Government poultry farm, pens of pullets on free range were fed a mash of corn meal, bran, and middlings, and a scratch mixture of wheat, oats, and corn. This is a greater variety of grains than is used by many farmers. In addition the birds had absolutely free range on land where bugs, green feed, and worms were plentiful. Other pens were given the same ration,

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with 1 pound of commercial meat scrap added to every 4 pounds of mash.

The pullets without the meat scrap laid only 90 eggs apiece (which is more eggs per hen than the average farm flock lays), while those receiving meat scrap averaged from 125 to 150 eggs apiece.

Meat scrap is not produced on most farms, and has to be bought at a higher price than grain. It produces eggs, though, several cents a dozen cheaper than where no meat scrap is used. Milk products or fish give as good results as meat in increasing egg production.

#### Control Measures Given for Bacterial Wilt.

Infection with the bacterial wilt of cucurbits does not occur through soil or seed. The striped cucumber beetle and the 12-spotted cucumber beetle are both summer carriers, and probably the only means of summer transmission of the disease in the localities that have been studied. Introduction of virulent bacteria into the interior plant tissues is necessary for infection.

The disease occurs in 31 States, including the territory from Vermont and Canada to Florida and west to Minnesota, Nebraska, Colorado, and Texas. The disease also probably occurs in parts of California. Of the common domestic cucurbits the disease affects cucumbers, cantaloupes, summer and winter squashes, and pumpkins, but not watermelons.

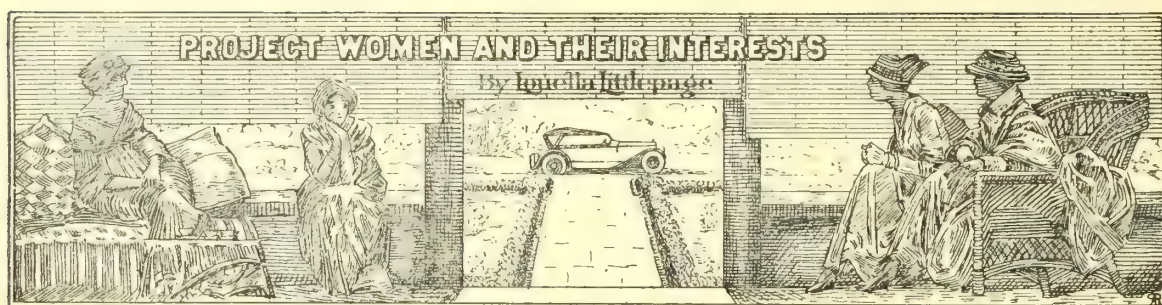
#### CONTROL MEASURES RECOMMENDED.

Spraying with strong Bordeaux mixture and lead arsenate paste (4-5-50 plus 2) is recommended where the disease is likely to be severe. Treatments should begin as soon as the cucumber plants develop their first true leaves and should continue at intervals of about a week until the cucumber beetles practically disappear from the field. In localities where downy mildew is also prevalent the treatments should be continued later as a partial insurance against this disease. The beetles prefer unsprayed plants as food, and undoubtedly the efficiency of wilt control would be enhanced if a slightly earlier trap crop, such as squash, were planted along the edges of the cucumber field. The beetles could be easily poisoned there with a strong insecticide.

Pulling wilted vines during the first part of the season, or as long as it can be done without mechanically injuring the healthy plants, will greatly assist in controlling bacterial wilt if consistently done in all neighboring fields. The diseased vines should be buried or otherwise removed from access by the beetles.

Too many dairymen have among their herds cows which are not only not paying but which are actually eating up the profits made by the rest of the herd.





### Wha's Yo' Ben?

After much importuning, and against her better judgment, Dinah had given her pickaninny a dime to buy a ride on the merry-go-round. When it was over, her ire which had been steadily increasing, burst loose, and she indignantly inquired: "Now, yo's spent yo' money and gone roun', and roun', and roun', but wha's yo' ben?"

Many of us might find it profitable to ask ourselves the same question, for the excitement and whirl of war time had not abated when mounting prices forced higher wages, and strikes, and shortened days made a bad matter worse by still further reducing production, which is yet decidedly too low. So we go round, and round, and round, working madly, getting a little more money for our wares, perhaps, and turning it over immediately to the profiteer, and when it is all over where have we been? Not even to some child's paradise where we were filled and thrilled with delight, nor where sugar plums grow on every bush; we get off at the same old spot, the starting point.

That women are already unconsciously solving this problem is evidenced by recent communications from some of the Government irrigation projects. They are realizing that they must increase the products of their hands and brains, and that more care must be exercised in expenditures.

In Glasgow, Mont., on the Milk River project, the women have united in a thrift experiment, under the leadership of Miss Hester Pollock, who attended the National Conference on Thrift, at Cleveland, Ohio. The test calls for:

*The first month.*—Keep accounts of individual and household expenses for such items as rent, food, clothing, household service, amusement, and incidentals.

*The second month.*—Save, each individual analyzing the previous month's expenses, thereby effecting a saving without hardship.

*The third month.*—Invest, each individual making a calculation of how much is saved and to invest these savings in Government or other first-class securities.

They have decided that we can not effectively fasten the blame for the high cost of living on the profiteers or any other group until we have made such an analysis of our own personal transactions in buying food, clothing, and other necessities that we can say we are spending our incomes with such care and forethought that we are not guilty of profiteering on our own personal pay checks.

On another of our projects a versatile and busy little farm woman has solved her problem of increasing production, and that with the least outlay of time and strength. You'll like her story:

Nothing in the whole wide world makes a woman so self-conscious, so utterly dissatisfied and miserable, as out-of-date clothes. She may naturally and properly prefer that the operation and maintenance charges should be paid; that the debt on her new home be constantly cut down; and that one more pure-bred animal be added to the growing herd; but when she goes to church or town on a bright spring morning under that old hat, nine chances out of ten she comes home feeling as though she had lost her last friend, and almost wishing that when she chose her career she had decided to work for pay instead of love.

It was so that a little farm woman confided a few days ago, but it was not in the spirit of complaint she wrote. Far from it! The pioneer spirit that can fight Nature in her most uncompromising mood, that can subdue the desert and make an attractive and prosperous home from a tract of utter desolation, while it may not rise superior to the psychological depression caused by a shabby appearance, can find a happy solution to such really trivial problems every time.

"I went to school with Anne Brewster," she wrote, "back in Illinois, and we wore the same pretty ribbons and gowns and had our vacations and little luxuries on about the same scale. She studied stenography and took a position with a big manufacturing firm, and I felt just a little superior when I married a graduate of our agricultural college and moved to a farm on a Government irrigation project. We had put in five years of hard work on our desert home and were just beginning to see easier times ahead when

we would not have to deny ourselves the little luxuries of former days, and things were looking very bright to me one Sunday morning, when there walked into church, all daintiness and style, Anne Brewster with an old Illinois family whom she had come to visit. Her look of joyousness at our meeting was immediately followed by one of undisguised surprise, and at once I sensed the cause. She had never seen me so shabby before. I couldn't explain to her that Henry gives me everything he has; that it was my ambition as well as his that had been putting every cent into our new home, and as I rather hurriedly slipped away the tears were very near the surface. My discomfort was increased by Henry's enthusiastic remarks concerning my girlhood friend and eagerness that she should come and make me a long visit. Every word aggravated me beyond words. Henry is really a model husband, but has no more idea of a woman's pride and prejudices than a soft-eyed, kind-faced old Newfoundland. It never occurred to him that an old hat maketh a dull wife.

"The next day, all uninvited, Anne breezed in, and almost the first thing asked if I were not surprised that in this day of ridiculous prices she could afford a trip West and 'Oh, you should see all the pretty clothes I have brought with me.' It seems she had adopted as her fad, her recreation from business, a surprisingly lucrative industry. 'It works while I sleep,' she told me, 'and the profits are put into a separate account to be used to purchase the luxuries and pleasures my New England ancestry will not allow me to take from my nest egg.' To make a long story short, little Anne had developed the bee industry on a small scale in her spare time, and when she had gone into details I immediately made arrangements to secure a couple of hives for myself.

"The first year I had 130 pounds of honey to sell, which brought me \$21, and in addition two extra swarms of bees. At the end of the third year I had 15 swarms, and had that year sold \$75 worth of honey, besides having used what we relished on my own table. I intend to limit my apiary to 25 or 30 swarms, and figure that the slight labor required to care for them will not add materially to my burdens, and at the same time I shall have a perpetual luxury or emergency fund that will suffice for my simple needs."

It is hard to understand why so few women have taken up this work. In some sections project men have developed quite a profitable industry in the production of honey, and press reports from State and county fairs indicate that the quality of this honey is superior, the flavor being exceptionally fine, and the color clear and sparkling. The work is comparatively light and much more suited to women than much that is usually required of them, and with intelligent care the returns are almost certain.

According to the information at hand, obtained from a bee man on one of our projects, one hive of bees, costing about \$7, will produce an average of 70 pounds of honey a year, worth at prewar prices 10 cents per pound, a profit of 100 per cent, net, because, forsooth, the predatory bees do their foraging on the neighbors' alfalfa and collect their own food. In addition, the increase in the number of swarms averages 100 per cent from year to year, doubling your capital and making altogether a total of about 200 per cent profit the first year on the original investment.

Alfalfa is the chief source from which bees on the Government projects secure their supply, and, as it blooms constantly from early spring until late in the fall, the bees have something to work on all the time, allowing a greater amount of honey to be stored.

Many of the irrigation projects are located in famous fruit sections, and the combination is found to be of mutual advantage. The trees furnish an abundance of honey during the blossoming period, and orchard men state that the economic importance of the bee, from the standpoint of its value in the pollenization of fruit, can not be overestimated. White clover and small fruits, and in the plains regions many varieties of wild flowers, also furnish sources of supply.

The wholesomeness of honey as a food, together with its well-known food value, adds to the interest of the "home-grown" variety, especially with the price of sugar in the clouds and but little to be obtained at any price.

The United States Department of Agriculture has worked out some delicious combinations with honey as a sweetener, and these include breads, sandwiches, cakes, pastries, sauces, icings, sirups, and preserved and candied fruits. They have issued a pamphlet on "Honey and Its Uses in the Home" which contains a large number of recipes and a great deal of valuable information concerning its properties and value. This pamphlet can be obtained free for the asking. It is known as Farmers' Bulletin 653.

Honey can be used in place of sugar for some kinds of preserving, and there is reason to believe that fruits cooked in it keep splendidly. Bar-le-duc currants, which form a very delicate and expensive article of commerce, are usually made by cooking the seeded currants in honey. They are frequently served with cream cheese and crackers or other form of bread. A satisfactory substitute may be secured by serving honey with tart fruit, either cooked or uncooked, with cottage cheese and bread and butter. Three ounces of cottage-cheese kurd, 2 ounces of bread,  $\frac{3}{4}$  of an ounce of butter (either added to the kurd or spread on the bread), 2 ounces of honey, and 6 ounces of strawberries or other watery fruit make a well-balanced meal. Sometimes honey alone



is served with cream cheese. Crisp crackers spread with cream cheese and honey form a good combination, both from the point of view of nutritive value and taste. Honey is fine substituted for sugar in baking apples.

### A Trip Around the World.

The Alpha class of the M. E. Sunday School of Fallon, Newlands project, Nevada, recently gave a social evening which proved to be a very unique affair and which presents unlimited suggestions for entertainment by club or other organizations.

About 75 persons participated in the long journey, which took them from New York City to Ireland, Japan, Hawaii, and back to the domain of Uncle Sam via the Golden Gate. Autos conveyed the guests from the church to the home of Dr. and Mrs. F. E. Nichols, where cake and sherbet à la New-York were served. The next home represented Erin, and here a typical Irish bride and groom met the guests and ushered them into the dining room, where refreshments of potato salad, tea, and wafers were dispensed. From here the next stage of the journey carried the crowd to the W. A. Simmonds home, where a bevy of slant-eyed young ladies served rice in bowls to the guests, who were required to sit on the floor in true Japanese fashion. After this, a Japanese game was played and tea and cakes served.

At the home of Mr. and Mrs. L. E. Cline pineapple cream and wafers were served, in keeping with the country which this station was supposed to represent, Hawaii, and a Hawaiian orchestra furnished music. From here return was made to the church, where games typical of the homeland were played and fruit punch served.

### Awkward Ways Waste Energy.

From buttoning shoes to washing dishes there is an easy and an awkward way of doing all work, as everyone well knows. Now along comes the scientist who says his experiments shows that, aside from feeling and looking more comfortable when you do your work in the right way, you also save considerable energy.

In the home economics division of the Department of Agriculture they have a calorimeter for measuring the exact amount of energy it takes to perform the various household tasks and other requirements of the individual in the various circumstances of his daily life, and for use in estimating the amounts and kinds of food required by him to meet the needs of his body for energy.

They have found that in the homely everyday task of washing dishes, when a woman used a table so low she was obliged to bend over, her energy output was 30 calories per hour. When she washed them on a table a little too high for comfort, it required 25

calories per hour, while only 21 calories were used when the working surface was of the right height.

It doesn't take long to saw off the legs of a table or to put blocks under it to make it the right height. If you have a sink put in, see to it that the plumber doesn't put it the "regulation" height, which is 30 inches, and which is a back breaker for any woman in the world. See to it that your tools fit your requirements.

### Hot Weather and Babies.

"Although mothers generally know that summer is a dangerous time for young infants, many do not understand that the heat by itself is one of the chief sources of danger." This warning was recently sent out by a noted specialist. So much has been said about the care of the milk in hot weather, and about the rôle played by flies in the transmission of intestinal diseases, that frequently insufficient attention is paid to keeping the infant cool.

The infant's clothing should always be adapted to the weather. On very hot days the less clothes the better. Two garments are usually sufficient on a very hot day, but the use of rubber is poor practice. It retains heat and moisture and causes trouble.

Frequent bathing is excellent. When tepid water is used it not only cleans the skin of offensive and irritating perspiration, but cools the body and improves its tone.

Over-feeding should be avoided. Experience has shown that excessive hot weather reduces the tolerance for foods. The mistake is often made of relieving the infant's thirst by excessive quantities of milk. Mothers should remember that in hot weather infants require water to drink in addition to their milk feeding.

Out of doors in the shade is usually the best place for infants in hot weather. But care should be taken in the choice of places, and at times it may be that the infant can be kept cooler and made more comfortable in a room with the blinds closed.

For those who have electricity a small electric fan may prove a life saver for the baby, as the beneficial influence of keeping the air in motion is well established. But bear this in mind: Never under any circumstances allow the direct breeze from the fan to touch the child. It should merely be used to keep the air in motion, although placed facing a wet cloth causing evaporation somewhere in the room cools the air wonderfully.

Although always important, scrupulous cleanliness in caring for infants is absolutely imperative in hot weather. Soiled and damp clothing should be changed promptly and should *always* be boiled and thoroughly washed before being used again. It is most important not to allow the baby's skin to become irritated and infected from delay and carelessness in changing

wet and soiled clothes. A few minutes spent in sponging the skin and carefully drying may save much trouble and anxiety.

Breast feeding is still one of the most important preventive measures against summer diseases, and all mothers should be impressed with this responsibility to their little ones.

These are a few of the warnings sent out by the Public Health Service of the Government.

### **A New Kink to the Cooking Club.**

To make sure that the girls in the home-making clubs are able to put to practical use what they have learned in the clubs about buying, cooking, and serving food, their leaders in Connecticut have organized "supper clubs."

These clubs meet twice a month at the local leader's home. At the first meeting of the month a well-balanced meal is planned with the help of the leader. Each girl is assigned a certain part of the meal, for which she is responsible.

At the second meeting she brings the material and prepares, cooks, and serves her part of the supper. Adults are asked to these suppers, and the invitations are highly prized. The usual menu consists of meat, potatoes, one vegetable, hot bread, salad, dessert, and a hot drink. So far the average cost per person served has been 24 to 26 cents.

After the meal the club girls meet in a group and discuss and criticize the various articles on the menu and the serving. This constructive criticism has been found very valuable in making each supper a little better in every way than the preceding one.

These practical demonstrations serve to fix firmly in the minds of the girls the various lessons they have had along these lines. In one county there are six of these clubs.

### **Project Woman Makes Record.**

It has just been learned here that the record long staple cotton of the Salt River Valley was sold in February by Mrs. C. C. Pitrat at \$1.02 per pound.

With the dollar mark for cotton reached and passed it remained for a woman to raise the crop which sold at the highest price ever paid for cotton sold in the regular way and in the ordinary course of business.

Mrs. Pitrat, who has the distinction of raising and selling this cotton, resides on her ranch 6 miles north of Phoenix. The highest previous price received was paid to Dr. A. J. Chandler, who received a little less than \$1.01 per pound for his immense crop on a section of land, the entire crop bringing \$180,000.

### **Eggs for Next Winter.**

The process of preserving eggs in sodium silicate or water glass when eggs are cheap and plentiful is

well known to many people, but lest some have forgotten the details bear in mind that eggs laid in April, May, and early June have been found to keep better than those laid later in the season. Fresh eggs properly preserved remain in excellent condition for 8 to 12 months.

If satisfactory results are to be obtained, the eggs should be fresh and clean, and if possible infertile. Eggs which float when placed in the solution are not fresh and therefore can not be preserved. When an egg is only slightly soiled a cloth dampened with vinegar can be used to remove the stains. Under no circumstances should eggs which have been stained and soiled be used for preserving. If put in the jar while dirty they will spoil, and washing removes a protective coating which prevents spoiling.

A good method for the preservation of eggs is the use of sodium silicate or water glass. At the average price of 30 cents a quart eggs may be preserved at a cost of approximately 2 cents a dozen. It is not desirable to use the solution a second time.

Use 1 quart of sodium silicate to 9 quarts of water that has been boiled and cooled. Place the mixture in a gallon crock. This is sufficient to preserve 15 dozen eggs and will serve as a guide for other quantities.

The crock should be cleaned thoroughly and then scalded and allowed to dry. Heat the water to the boiling point and allow it to cool. When cool measure out 9 quarts of the water and place in the crock, then add 1 quart sodium silicate, stirring the mixture well. Place the eggs in this solution. It is not necessary to put all the eggs in at one time, but they may be added as obtained from time to time. Allow at least 2 inches of the solution to cover the eggs at all times. The crock should be kept in a cool dry place and kept covered to prevent evaporation.—L. L.

### **R. R. RUHNKE RESIGNS.**

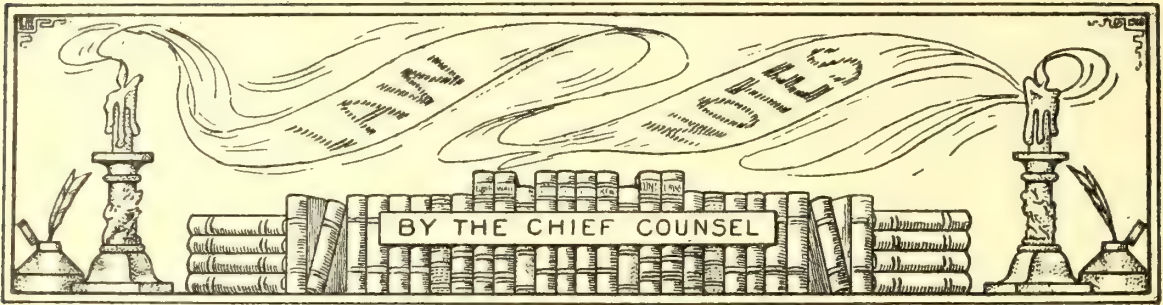
R. R. Ruhnke, a clerk in the accounting division of the Washington office, has tendered his resignation, effective May 31, to engage in private business in his home State of Nebraska.

Mr. Ruhnke entered the service on April 12, 1909, and was employed on the Yakima project, Wash., until February, 1917, when he was transferred to the Washington office.

Mr. Ruhnke has the best wishes of his former associates in his new venture.

Be sure that the sheep have plenty of pure, clean water during the hot weather.





### Compromise by Reclamation Service of Claims for Damages.

The sundry civil appropriation act of March 3, 1915 (38 Stat., 859), and subsequent appropriation acts, authorize the settlement of claims for damages to property in the following language:

Payment of damages to owners of land or private property of any kind by reason of the operation of the United States, its officers, or employees, in the survey, construction, operation and maintenance of irrigation works and which may be compromised by agreement between the claimant and the Secretary of the Interior.

The language of this provision is broad enough to include all damages to private property growing out of any authorized operations of the United States Reclamation Service. The fact that the negligence of an officer, agent or employee of the Government contributed to the injury of the property does not invalidate a claim for damages provided such negligence relates to the performance of the duty of the officer, agent, or employee, as distinguished from an act of wantonness or carelessness committed in a purely personal capacity. (See 21 Compt. Dec. 255.) The only class of claims which may not be compromised under this provision are those resulting from an accident growing out of an act of God, the public enemy, or the act of some person in his private capacity. This authority will not be invoked to compromise any claim which would not be a legal claim against a private irrigation concern under similar circumstances. (Departmental Decision, May 7, 1920; C. L. 885.)

### Order Discontinuing Temporary Water Service Under War-Time Act.

DEPARTMENT OF THE INTERIOR,  
Washington, D. C., April 23, 1920.

In pursuance of the provisions of the act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, it is hereby ordered that all existing contracts for temporary water service from Federal irrigation projects, made under sections 11 and 12 of the act of August 10, 1917 (40 Stat.,

273), and the regulations of October 4, 1917 (46 L. D., 213), promulgated by the Department of the Interior, are hereby canceled, effective December 1, 1920; and that no irrigation water will be furnished after said date for any of the lands under public notice, described in any such contract, except under a water-right application.

JOHN BARTON PAYNE,  
*Secretary of the Interior.*

### Rights of Way and Easements for Federal Irrigation Projects.

The following bill (S. 4421-McNary and H. R. 14102-Kinkaid) has been introduced in the Congress at the request of the Secretary of the Interior:

A Bill securing rights of way and easements over public land in connection with Federal irrigation projects.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That where a right of way or easement of any kind over public land heretofore or hereafter withdrawn under the Act of June 17, 1902 (Thirty-second Statutes, page 388), is required in connection with a Federal irrigation project, the Secretary of the Interior may cause to be executed and recorded in the office of the recorder of deeds of the county in which the land is located an instrument stating the purpose of the right of way or easement, with a description of the same, in which event entry thereafter made for such land and the patent issued therefor shall be subject to the right of way or easement so described in such recorded instrument.

### Title of State in Indemnity Public Lands.

A State, which was owner of school land included within a national forest reserve, by selecting and making application for lieu land in compliance with the statutes and regulations, acquires no estate, legal or equitable, in the land selected, as against the United States, prior to approval of its application by the Commissioner of the General Land Office, and

pending such approval it is subject to withdrawal from selection as mineral land. (*United States v. Ridgely et al.*, 262 Fed., 675.)

### Refusal of Water for Failure to Pay Water Charges.

A provision in a contract between a Carey Act (U. S. Comp. St. par. 4685) construction company and a purchaser of water to be delivered from the irrigation system to be constructed by the company, to the effect that no water shall be delivered to the purchaser from said irrigation system while any installment of principal and interest is due and unpaid from the purchaser to the company, or while any toll or assessment is due or unpaid from the purchaser, is invalid and void in so far as it provides for nondelivery of water on account of failure to pay principal and interest installments upon the purchase price, or for nonpayment of tolls or maintenance assessments levied in preceding years. It is valid as applied to the payment of maintenance assessments for the current year. (*Parrott v. Twin Falls Salmon River Land & Water Co. et al.* (Idaho), 188 Pac. 451.)

### Homestead Entry by Soldier Employees of Reclamation Service.

Departmental Regulations of May 2, 1918, which prohibit employees of the Reclamation Service from filing upon irrigable lands within a Federal irrigation project until the same shall have been opened to public entry for a period of at least 90 days, are amended by excepting from the prohibition soldiers, sailors, and marines having a preferred right of entry under Public Resolution No. 29, approved February 14, 1920 (41 Stat., —). (Departmental Decision, Feb. 19, 1920; C. L. 874.)

### Congressional Bills of Interest to Our Readers.

#### IN THE SENATE.

The following bills, which originated in the House, have passed that body and are now being considered in the Senate:

*H. R. 8690.*—"An act for the relief of certain homestead entrymen." Passed the House April 19, 1920.

*H. R. 13592.*—"An act to authorize certain homestead settlers or entrymen who entered the military or naval service of the United States during the war with Germany to make final proof of their entries." Passed the House April 19, 1920.

*H. R. 13870.*—"An act making appropriation for sundry civil expenses of the Government for the fiscal year ending June 30, 1921, and for other purposes." Passed the House May 11, 1920.

#### IN THE HOUSE.

*H. R. 13874.*—"A bill to provide adjusted compensation for veterans of the World War; to provide revenue therefor; and for other purposes." Introduced April 30, 1920, by Representative Jos. W. Fordney, of Michigan. This is a revision of H. R. 13293 and is known as the American Legion bill.

*S. 3895.*—"An act authorizing the granting of certain irrigation easements in the Yellowstone National Park, and for other purposes." Passed the Senate April 6, 1920.

*H. Res. 544.*—"Resolved that immediately upon the adoption of this resolution the House shall resolve itself into the Committee of the Whole House on the state of the Union for the consideration of S. 3477, a bill 'to increase without expenditure of Federal funds, the opportunities of the people to acquire rural homes, and for other purposes.'" Introduced May 5, 1920, by Representative M. P. Kinkaid of Nebraska.

—Will R. King.

### SUMMARY OF ACCOMPLISHMENT BY THE RECLAMATION SERVICE.

A summation of the work of the Reclamation Service to December 31, 1919, shows that the projects now under way or completed embrace approximately 3,200,000 acres of irrigable land divided into about 67,500 farms of from 10 to 160 acres each. During the year, water was available from Government ditches for 1,935,278 acres on 41,836 farms, and the Government was under contract to supply water to approximately 1,690,000 acres. The available reservoir capacity at this time was approximately 9,432,000 acre-feet.

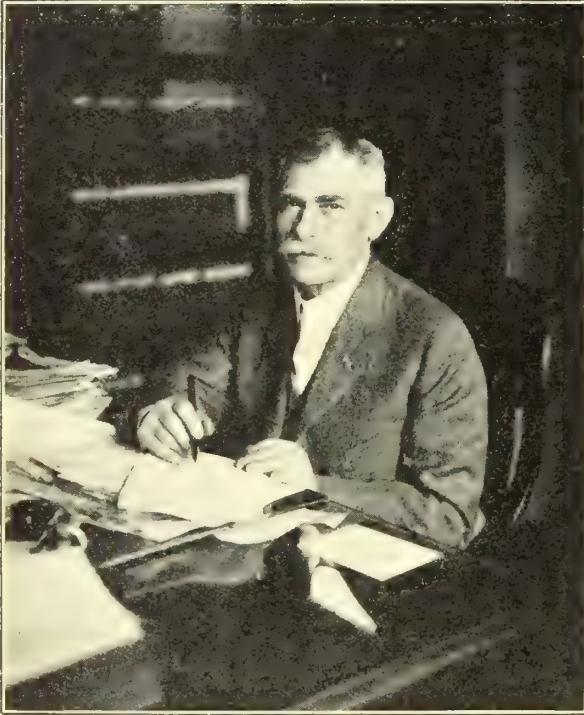
The Service has dug 12,489 miles of canals, ditches, and drains and excavated 95 tunnels with an aggregate length of more than 27 miles. It has erected masonry, earth, rock-fill, and crib storage and diversion dams with a total volume of 13,729,343 cubic yards. It has built 7,041 bridges with a total length of over 30 miles. Its culverts number 9,196 and are 60 miles long. There are now in operation 509 miles of pipe line and 103 miles of flumes.

The Service has built 983 miles of wagon road, 83 miles of railroad, 3,141 miles of telephone lines, 651 miles of transmission lines, and 1,424 buildings, such as power houses, pumping stations, offices, residences, barns, and storehouses. The power developed amounts to approximately 60,000 horsepower. The excavations of rock and earth amount to 174,444,921 cubic yards. The Government has used 2,992,780 barrels of cement and has manufactured 1,676,671 barrels of cement and sand cement.



**MORRIS BIEN NEW ASSISTANT DIRECTOR.**

Morris Bien, for the past year assistant to the Director of the Reclamation Service, has been advanced to the newly created position of assistant director, effective June 1, 1920.



MORRIS BIEN, ASSISTANT DIRECTOR, U. S. RECLAMATION SERVICE.

Mr. Bien has been employed in the Reclamation Service since July, 1902, when he was transferred from the General Land Office to take charge of land and legal matters connected with the work of the Service.

Mr. Bien holds the degrees of Ph. B. from the University of California; LL. B. from George Washington University; and LL. M. from the National University. He is a member of the American Association of Engineers, the Washington Society of Engineers, the National Geographic Society, and the Cosmos Club of Washington, D. C.

Only a short ride on country roads is necessary to convince even the casual observer that farmers as a rule do not give sufficient attention to machinery and implement conservation.

**OTTAMAR HAMELE NEW CHIEF COUNSEL.****Judge King Resigns to Reenter Private Practice.**

Judge Will R. King, for seven years chief counsel of the Reclamation Service, has tendered his resignation to Secretary Payne, effective June 15, 1920. He is succeeded by Ottamar Hamele, who has been a member of the legal division of the Washington office for the past four years and assistant to the chief counsel for the past two.

A notable achievement of Judge King while chief counsel of the Reclamation Service was the securing in the 17 arid States of substantially uniform laws permitting appropriate cooperation between irrigation districts organized under State law and the United States.



OTTAMAR HAMELE, CHIEF COUNSEL, U. S. RECLAMATION SERVICE.

Judge King retires with the best wishes of his associates for continued success in his chosen profession. At the same time the Service is to be congratulated on having in its own organization such a worthy successor as Mr. Hamele.

Mr. Hamele was born April 19, 1878, in East Otto, Cattaraugus County, N. Y. He published a weekly

newspaper in his native town from 1894 to 1899. He was graduated from Griffith Institute, Springville, N. Y., in 1900, and was admitted to the New York bar in March, 1903. Upon admission he formed a law partnership with Edwin A. Scott, an older lawyer having a large established practice at Springville, and was very actively engaged as a member of this firm for nine years, handling many large and intricate cases and doing much trial and appellate work. In 1912 he removed to Pawhuska, Okla., where he practiced his profession until January 22, 1916, when

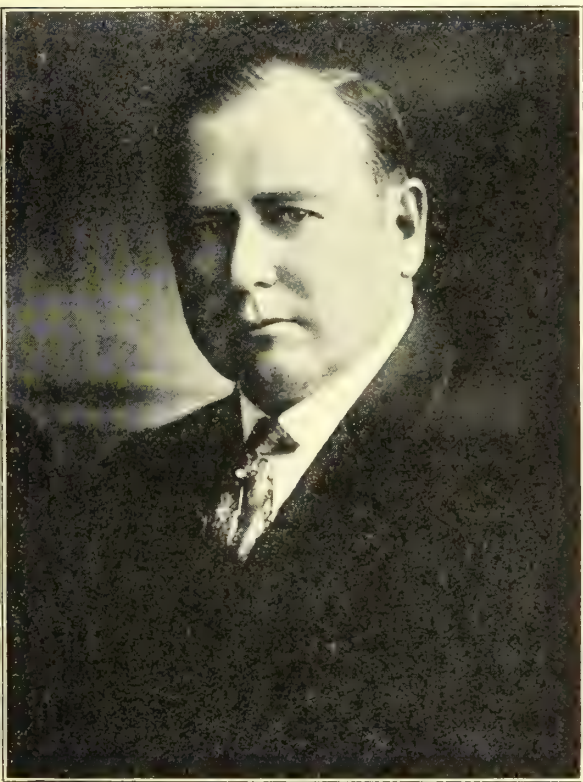
involved in the reclamation of arid lands, I have keenly enjoyed this relationship though at a financial loss to myself. But for some time past I have been considering a return to the private practice of law, and have now decided to take that step.

I accordingly tender my resignation as chief counsel of the Reclamation Service, effective June 15, 1920.

Sincerely yours,

WILL R. KING,  
*Chief Counsel.*

Hon. JOHN BARTON PAYNE,  
*Secretary of the Interior.*



JUDGE WILL R. KING, RETIRING CHIEF COUNSEL

he entered the Reclamation Service in connection with the examination of water rights in the Colorado River Basin.

In connection with these changes in organization, the following correspondence passed between Judge King, Director Davis, and Secretary Payne:

DEPARTMENT OF THE INTERIOR,  
UNITED STATES RECLAMATION SERVICE,  
*Washington, D. C., May 11, 1920.*

MY DEAR MR. SECRETARY: I have now served for seven years in the Department of the Interior as chief counsel of the Reclamation Service. Being deeply interested in all of the many problems in-

DEPARTMENT OF THE INTERIOR,  
UNITED STATES RECLAMATION SERVICE,  
*Washington, D. C., May 11, 1920.*

MY DEAR MR. SECRETARY: Supplementing my resignation handed you to day, permit me to recommend that my successor be Mr. Ottamar Hamele. Mr. Hamele has been in the legal division of which I have been the head for over four years, and during the last two years of that time has been my first assistant. I have found him always industrious, energetic, and anxious to perform the duties of his office to the best of his ability. In legal qualifications I think he will compare favorably in ability to justices of our various appellate courts. He is also a good organizer and one whom any person who may know him will deem worthy of confidence and trust. I deem Mr. Hamele eminently fitted for the position of Chief Counsel of the United States Reclamation Service.

Sincerely yours,

WILL R. KING,  
*Chief Counsel.*

Hon. JOHN BARTON PAYNE,  
*Secretary of the Interior.*

DEPARTMENT OF THE INTERIOR,  
UNITED STATES RECLAMATION SERVICE,  
*Washington, D. C. May 11, 1920.*

The SECRETARY OF THE INTERIOR.

DEAR MR. SECRETARY: I respectfully recommend the promotion of Mr. Ottamar Hamele from counsel to chief counsel, effective June 15, 1920.

Mr. Hamele has been in the Reclamation Service about five years and was previously in private practice in Oklahoma and elsewhere. He is well grounded in irrigation law and in the general lines of law useful to the Reclamation Service. He also has a logical mind and great diligence in the preparation of his work, and I have found him a useful adviser on general matters of administration and procedure.

Very respectfully,

A. P. DAVIS, *Director.*



THE SECRETARY OF THE INTERIOR,  
Washington, May 11, 1920.

MY DEAR JUDGE KING: I beg to acknowledge receipt of your letter of this date tendering your resignation, effective June 15, due to the fact that you desire to return to private practice, and that you recommend the appointment of Mr. Ottamar Hamele as your successor. I quite understand the necessity of lawyers retiring from the public service to enter private prac-

tice on account of the limited Government salaries. I therefore accept your resignation and will appoint Mr. Hamele as per your recommendation. Meantime, you will be free to give attention to your private matters.

Cordially, yours,

JOHN BARTON PAYNE.

HON. WILL R. KING,  
*Reclamation Service.*

## DEATHS AND ACCIDENTS IN THE SERVICE.

### Homer Hamlin, 1864-1920.

Homer Hamlin, consulting engineer of the Reclamation Service, died from apoplexy on May 14, 1920, in the Willard Hotel, Washington, D. C.

Mr. Hamlin was in Washington as a representative of the Salt River Valley Water Users' Association in connection with the controversy with the Paradise Verde Irrigation District over a reservoir site on the Verde River, a hearing on which had been arranged before Secretary Payne.

Mr. Hamlin's connection with the Reclamation Service began January 1, 1903, and as a consulting engineer both in public and private work and in the capacity of city engineer of Los Angeles, Calif., he made a splendid record. His sudden death is a shock to his many friends both within and outside the service.

### L. C. Cunningham.

L. C. Cunningham, a truck driver on the Rio Grande project, was instantly killed on April 21, when the truck he was driving was struck by a freight train about 6 miles south of Las Cruces.

### C. I. Julian.

A telegram has been received from Project Manager Casteel of the Okanogan project, Wash., stating that Mr. C. I. Julian, lineman, was electrocuted while working on the transmission line on May 5.

### Mrs. C. M. MacMullen.

Mrs. C. M. MacMullen, a clerk in the auditing section of the Washington office of the Reclamation Service, was seriously injured on her way to work, May 1.

Mrs. MacMullen was thrown from a street car as it rounded a curve near her home, and was badly bruised about the head and body. She was taken up unconscious and conveyed to her home and later to

the Homeopathic Hospital, where she did not recover consciousness for several days. As we go to press Mrs. MacMullen is reported to be recovering, although it will probably be some time before she is able to resume her work.

## R. K. TIFFANY RESIGNS.

R. K. Tiffany, who for many years has been project manager of the Yakima project, Wash., has resigned to accept a position with the Union Trust Co., of Spokane, Wash., as manager of the operation and extension of the Spokane Valley Land & Water Co., which owns the Corbin ditch in the Spokane Valley.

W. J. Kommers, president of the Union Trust Co., stated that the concern had been seeking for a man of proper caliber since last fall. "We were determined to engage the services of the biggest man in this field of activity in the country, preferably a western man," he said. "In Mr. Tiffany we believe we have secured such a man. It was his great executive ability, his breadth of vision, and his practical experience as an engineer which have made him such a factor in the successful upbuilding of the Yakima Valley."

J. L. Lytel, former project manager of the Strawberry Valley project, Utah, succeeds Mr. Tiffany as project manager of the Yakima project, and is in turn succeeded by W. L. Whittemore as acting project manager.

## BOOKS REVIEWED.

HANDBOOK OF THE IRRIGATION DISTRICT LAWS OF THE 17 WESTERN STATES OF THE UNITED STATES. By Will R. King, chief counsel, United States Reclamation Service, and formerly associate justice of the Oregon Supreme Court; and E. W. Burr, district counsel, United States Reclamation Service, in charge of relations with irrigation districts; 213 pages, 6 by 9, paper covers; printed by House Committee on Irrigation of Arid Lands.

This volume is the only treatise of its kind. It bears date December 20, 1918, but includes addenda outlining changes made in the 1919 session laws.

The first part of the work treats of the purpose, formation, powers, and dissolution of irrigation districts, with citations to all of the important decisions of the courts; the last part is a digest of the State statutes upon the subject. The book contains a table of cases covering 6 pages and an exhaustive index of 33 pages.

FEDERAL RECLAMATION LAWS ANNOTATED. By Ottamar Hamele, counsel, United States Reclamation Service; 200

pages, 6 by 9, paper covers; printed by House Committee on Irrigation of Arid Lands.

This work is brought down to January 1, 1920, and is a chronological compilation of 80 Federal statutes under which the United States Reclamation Service operates, with notes of decisions of the courts, the comptroller, the Attorney General, the Department of the Interior, and the Reclamation Service.

## RECLAMATION ABROAD.

### Notes from Various Sources.

#### Irrigation in Australia.

*General.*—Australia's first experiments in irrigation were made with the object of bringing under cultivation areas in which an inadequate rainfall rendered agricultural and even pastoral occupations precarious and intermittent, and, although these original settlements have for the most part proved fairly successful, most of the States, instead of promoting new settlement in unoccupied regions, are adopting the policy of making existing settlement closer, by repurchasing big estates and large farms, subdividing them into holdings of suitable sizes for cultivation, and selling the land upon easy terms of payment. It is in connection with this closer settlement policy that the special value of irrigation is recognized.

*New South Wales.*—Within the State of New South Wales the system and the works necessary to its maintenance and development are under the control of the Water Conservation and Irrigation Commission, which consists of the Minister for Agriculture, for the time being as chairman, and two other commissioners. The works controlled by the commission include the great Murrumbidgee irrigation scheme, the small irrigation settlements at Hay and Wentworth, natural works of water conservation, shallow boring for settlers, and water trusts and artesian bore trusts operating under the water act. The commission has control also of storages and diversions of water by private persons for purposes of conservation and irrigation.

The Murrumbidgee irrigation scheme comprises a catchment area of about 5,000 square miles drained by three principal streams—the Murrumbidgee, Goodradigbee and Yass Rivers—up which the water will be backed when the reservoir is full, to a distance of 41, 15, and 22 miles, respectively. The irrigation area is situated on the northern side of the Murrumbidgee River where it is anticipated there will be upwards of 200,000 acres under irrigation in blocks devoted to fruit and vegetable growing, dairying, and stockraising.

The first area made available for settlement is in the vicinity of Yance Siding on the Hay railway line.

The second, on the northern side of Mirrool Creek, is served by the branch railway from Cootamundra, which now terminates at Griffith, but which it is proposed to extend to Hillston.

Further areas are being thrown open for settlement as the construction works are completed. Farms varying in size from 2 acres to over 200 acres have been made available. The "water right" or number of acre-feet of water allotted to each holding is specified when public notice is given that the holding is available for application. The cost of water is five shillings per acre-foot. The charge for water is reduced during the early years. For the first year the charge is 2 shillings 6 pence per acre-foot and is thereafter increased annually by sixpence per acre-foot until in the sixth and following years the full rate of 5 shillings becomes payable. The average "all-irrigable" farm is about 50 acres, but to suit the requirements of dairymen and other stock farmers, blocks of larger areas have been made available. These comprise nonirrigable or "dry" areas, in addition to the irrigable portion. Some of these larger farms are 200 acres or upwards in extent, but the maximum water right allowed any of these larger farms is 80 acre-feet. Additional water may be obtained, if available, by arrangement.

*Victoria.*—In this division schemes are constructed and under construction for the supply of water to some 20 irrigation districts. Up to 1906 these schemes were controlled by local trusts, which had obtained money for their construction on loan from the State. By the water act of 1905 all local control was abolished except in the case of Mildura, and the districts were transferred to the State rivers and water supply commission. Since that date the Government has adopted a vigorous irrigation policy, and the capital expenditure on June 30, 1918, on water supply in the irrigation and water supply districts under the control of the commission and at Mildura was £4,155,000. The irrigation works draw their supplies mainly from headworks constructed on the Murray, Goulburn, and Loddon Rivers. The cost of these headworks, which amounts to £1,123,000, is not debited



to any particular districts, but is borne by the State. The area under irrigated culture, for all kinds of crop, is 175,000 acres.

The largest of Victoria's irrigation enterprises is the Goulburn River gravitation scheme and serves, either for irrigation or domestic or stock purposes, 867,000 acres of land. The gravitation system on the Loddon River, with 160 miles of channels, supplies an area of 74,000 acres for domestic and stock purposes and partial irrigation. The Murray and a number of other irrigation works in the State of Victoria have combined gravitation and pumping systems.

*Queensland.*—The main irrigation works in Queensland comprise those at Ayr, which utilize the waters of the Burdekin River, and shallow wells on its banks; those at Bingera, near Bundaberg, which utilize water pumped from the Burnett River just above the point of meeting of the salt and fresh waters; and those at Fairymead, which utilize water pumped from a number of shallow spear wells sunk on the alluvial flats on the north side of the Burnett River and about 6 miles from Bundaberg. There were 533 irrigators in the State in 1917, chiefly farmers and grazers, and the area irrigated was 4,467 acres.

*South Australia.*—Until 1910 irrigation in South Australia, with the exception of one system for watering about 5,270 acres, made little progress. In that year an irrigation and reclamation works department was created, and the preparation of land for irrigation settlements has since been vigorously pursued. The reclaimed and irrigated land in this district is chiefly available for dairying, fodder and fruit growing and stock raising. The purely agricultural industries predominate.

*Western Australia.*—An irrigation act has been brought into force providing for the constitution of irrigation districts. At Harvey the works for irrigating about 4,000 acres devoted to fruit growing, principally oranges, were formally opened on June 21, 1916. A scheme is in preparation for irrigating a further area of about 4,600 acres in the same district.

Numerous small private irrigation schemes are in full operation on many of the southwest rivers in connection with fruit, fodder, and potato growing.—*Edward J. Norton, American consul at Sydney, Australia, quoting from 1918 yearbook.*

#### Irrigation of Kalahari Desert, South Africa.

For the past few years much interest has been taken in the problem of the possibility of making the great Kalahari Desert fertile and productive.

Mr. August Karlson, late hydrographic engineer in the union irrigation department, brings forward two main ideas—one to irrigate the Otjo Plateau in the north of the South-West Protectorate, and the other to irrigate the Kalahari from the Zambezi River to

the Molopo River. The first scheme appears impractical. It implies diverting the water from the River Cunene, the boundary to the north of the protectorate, pumping it into a canal ending at the southwest corner of Etosha Pan, and then again pumping against a head of 1,000 feet to Otjo and Otavi. Mr. Karlson estimates the cost of pipes and pumping plant at 20,000,000 sterling, and with storage, canals, and distribution at 32,000,000, or £20 per acre. This estimate is based on very rough data, and we can not see, excluding the possibility of many other difficulties, that it would be fulfilled. For instance, Mr. Karlson states that the scheme would need 1,440 miles of 6½ feet diameter pipes, sufficiently strong to withstand this great pumping head.

The second scheme appears more possible. It is to irrigate the Kalahari from the rivers Okavango, Kwito, Chobe, and even Zambezi. A great canal is proposed from Andara on the Okavango at the commencement of the Caprivi strip, extending south for 640 miles to Lehututu, and thence to Molopo. The scheme would mean storage in Portuguese Angola. Mr. Karlson states that it seems possible thereby to irrigate 4,340,000 acres, or at 35 acres per farm, to give room for 620,000 inhabitants. Another canal would be taken out of the Zambezi above the Gonye Falls, across the Selinda River, and one large branch would pass through Tsau and west of Ngami to Anderson's Vlei, thereafter east to Makarikari. A third canal is suggested from above the Chobe Lake for irrigating the land nearer to the Chobe and to the Rhodesian border. In all, it is estimated that 8,200,000 acres can be irrigated, supporting 1,170,000 Europeans, and 1,600,000 acres with 1,600,000 natives. Part of the scheme is to manufacture cheap fertilizers from suitable water power on these great rivers. The cost is given as 15,000,000 sterling.—*Cape Times.*

#### Irrigation Projects of the Turkish Government.

The Ikdam (Constantinople), December 31, 1919, outlines as follows the plans of the Department of Public Works of Turkey, which are to be carried out upon the restoration of peace: In the vilayet of Adana improvement of the course of the Seihan, Djeihan, and Yerdan Rivers, and irrigation works; in the vilayet of Mosul, irrigation of the valley of Kerkouk. Preliminary plans are already concluded. In the vilayet of Siwas and sandjak of Samsun improvement of the course of the Kizil Irmak and Yechyl Irmak Rivers and works of irrigation. Plans are partially concluded. In the vilayet of Brusa improvement of the courses of the Nilufer River, and drainage and irrigation of the valley of Brusa. The definite plans are in great part already finished, and the work is near completion, while the rest is being pushed along actively. In the sandjak of Karassi improvement of the course of the Sousguirli, Caradéré, and Ghirmasti

Rivers, and drainage of the Manias and Epolivend Lakes. The definitive plans have been completed and the projects prepared. In the sandjak of Ismidt improvement of the course of the Sakharria River; drainage of the marshes and irrigation. In the vilayet of

Aidin improvement of the Menderé River and irrigation. The initial plans have already been worked out. Studies on the waters have been begun; improvement of the course of the Ghédis River and irrigation.—*Commerce Reports.*

## RECENT ENGINEERING ARTICLES RELATING TO THE WORK OF THE RECLAMATION SERVICE.

Bond, J. B. Controlled by-pass to suction permits continuous pumping. Short illustrated news item. Eng. News-Record, Jan. 8, 1920, vol. 84, p. 104.

Bond, J. B. Design and construction of Notus Canal inverted siphon, illus. Eng. News-Record, Apr. 29, 1920, vol. 84, pp. 860-861.

Branch, L. V. Use of heavy tractors for hauling elevating graders and wagon trains from steam shovel, Salmon Lake Dam, with costs, illus. Eng. & Cont., Apr. 21, 1920, vol. 53, pp. 451-454.

Burch, A. N. Comparative cost of concrete lining, Orland project, Cal. Eng. World, May, 1920, p. 406.

Burch, A. N. Costs of concrete canal lining compared. Eng. News-Record, May 13, 1920, vol. 84, p. 975.

Davis, A. P. Success of Reclamation Service. New West Magazine, Nov., 1919, p. 7.

Davis, A. P. Results of National Irrigation. Eng. & Cont., Jan. 14, 1920, vol. 53, pp. 54-55. (From December, 1919, Reclamation Record; Pac. Builder and Engineer, Jan. 30, 1920, vol. 26, p. 11.)

Eldridge, M. O. Road building in the Southwest, illus. Public Roads, July, 1919, vol. 2, pp. 15-18. (Views of Roosevelt highway of Apache Trail.)

Lane, E. W. Experiments on the flow of water through contractions in an open channel, illus. Discussion by D. C. Henny with Venturi experimental flumes on the North Platte, Boise, and Sun River projects, illus. Proc. Am. Soc. C. E., Apr., 1920, vol. 46, No. 4, pp. 593-6.

La Rue, E. C. What is the Colorado River Project? (with map). Mining and Oil Bulletin, Los Angeles, Cal., Apr., 1920, vol. 6, pp. 260-261, 286.

Preston, Porter J. The All-American Canal. Report on, with maps, and Canal Board Report, by Elwood Mead, W. W. Schlecht, and C. E. Grunsky, Porter J. Preston. Eng. News-Record, Mar. 18, 1920, vol. 84, p. 582. (Notice of report of 98 pages and 4 drawings.)

Schlecht, W. W. Proposed plans for the All-American Canal. Jour. of Electricity, Oct. 15, 1919, vol. 48, pp. 363-364.

Skerrett, Robt. G. Making farms out of deserts, illus. Scientific American, Apr. 3, 1920, vol. 122, p. 358.

Steward, W. G. Unique rod made for canal soundings and stream measurements, illus., Eng. News-Record, Jan. 1, 1920, vol. 84, p. 51.

Tiffany, R. K. Experience with insect larvæ in decreasing canal capacity (Tieton Canal). (From Reclamation Record, Feb., 1920.) Eng. News-Record, May 6, 1920, vol. 84, p. 923.

Ward, Walter. Reconstruction of the King Hill siphon and flumes, illus., Eng. News-Record, Apr. 1, 1920, vol. 84, pp. 661-663.

### EDITORIALS AND NEWS ARTICLES.

Engineer-Managers in the Operations of Irrigation Works (reference to work of the U. S. R. S.). Eng. News-Record, Jan. 22, 1920, vol. 84, p. 163.

Arthur Powell Davis elected President Am. Soc. C. E. (portrait and biography), Eng. News-Record, Jan. 22, 1920, vol. 84, pp. 199 & 201.

H. T. Cory to pass on Nile irrigation plans (portrait and biography). Eng. News-Record, Jan. 22, 1920, vol. 84, p. 204.

Chance for success of \$250,000,000 reclamation bond issue plea. Eng. News-Record, Feb. 12, 1920, vol. 84, p. 347.

Report on development of unused lands. Eng. News-Record, Feb. 19, 1920, vol. 84, pp. 375-377.

President Davis a Progressive. Eng. News-Record, Apr. 15, 1920, vol. 84, pp. 789-790.

All topographic interests to meet in Washington March 9. (Board of Surveys and Maps.) Eng. News-Record, Mar. 4, 1920, vol. 84, pp. 491-492.

To coordinate work of Federal mapping agencies. (Board of Surveys and Maps.) Eng. News-Record, Mar. 11, 1920, vol. 84, p. 546.

Drainage results and proposals on the Salt River Project. Eng. News-Record, May 6, 1920, vol. 84, p. 921.

Main features of Columbia Basin Irrigation Project, Washington. Eng. News-Record, Mar. 4, 1920, vol. 84, p. 456.

League of the Southwest considers Colorado River control. Eng. News-Record, May 6, 1920, vol. 84, p. 933.

Fresh paint on buildings gives an air of prosperity to the farm that nothing else can supply, and the value of the property is thereby greatly enhanced. This matter of appearance is vital in every walk of life.



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

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HUGH A. BROWN, EDITOR.

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#### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

\_\_\_\_\_, 1920.

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DEAR SIR: I am NOT a water user on one of the projects of the U. S. Reclamation Service, but wish to receive the RECLAMATION RECORD each month.

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We are very glad to receive the RECLAMATION RECORD, and assure you that we appreciate your magazine. There is considerable irrigation work being discussed in this section, and we feel that a magazine of this kind has a place with us.—Roy E. Miller, county agent, Grants Pass, Oreg.

## APRIL WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

April in the Western States was mainly moist and unusually cold. There was some mild weather about the 10th, also in the southern districts as the month was ending; but low temperatures for the season prevailed, with the lowest usually during the first week, although it was again cold from the middle to within a few days of the close of the month, particularly in Wyoming, Colorado, and portions of the States adjoining them. The month averaged cooler than normal throughout the West, save in parts of California, with a deficiency of 8° to 10° a day over most of the northern and middle portions of the Rocky Mountain and plains regions.

The first week brought considerable precipitation to the north Pacific Coast States and to several interior States, Wyoming having much snow at this time. During the second week there was moderate rainfall in the far Northwest, and in a few other sections. The third week of the month, however, was the notable period of precipitation, most parts of the Pacific States having ample amounts, and the majority of districts to eastward as well, except near the northern and southern borders; at this time there was surprisingly heavy snowfall for the season from southeastern Idaho and northern Utah eastward to the central portions of Nebraska and South Dakota. After the 20th there was little precipitation save near the northern border and in eastern Wyoming. The month's precipitation was decidedly large for the region from northern Utah eastward and northeastward to central Nebraska and the Black Hills, and it was rather large in northern Oregon and north-central Montana; in other northern and central districts it was about equal to or slightly greater than the normal, with a few exceptions. Nearly all of California, however, and southern districts from the southern portions of Nevada, Utah, and Colorado to the Mexican border had less than the normal April rainfall, and the same was true of almost all of western Texas.

The month was comparatively unfavorable for outdoor work, save in California, Arizona, New Mexico, and Texas; and outside of these same States the conditions were severe on live stock to an extent surprising for April, resulting in some loss and poor condition of surviving animals. Fruit was backward, and in a few places suffered frost injury, but generally was promising at the end of April. Except in the States where rain was scanty, small grains generally did fairly well, in spite of retarded growth.

Don't expect to get a high-class road horse from a mare with draft blood.

## WANTED: AGRICULTURIST, IRRIGATED FIELD CROPS.

United States Civil-Service Examination, June 22,  
1920.

The United States Civil Service Commission announces an open competitive examination for agriculturist, irrigated field crops. A vacancy in the Bureau of Plant Industry, Department of Agriculture, for duty on the Umatilla reclamation project, with headquarters at Hermiston, Oreg., at \$1,800 to \$2,400 a year, and vacancies in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The entrance salary within the range stated will depend upon the qualifications of the appointee as shown in the examination. Appointees whose services are satisfactory may be allowed the temporary increase granted by Congress of \$20 a month.

All citizens of the United States who meet the requirements, both men and women, may enter this examination; appointing officers, however, have the legal right to specify the sex desired in requesting certification of eligibles.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

<i>Subjects.</i>	<i>Weights.</i>
1. Education.....	30
2. Experience.....	50
3. Thesis or plan (to be filed with application)...	20
Total.....	100

Under the first two subjects competitors will be rated upon the sworn statements in their applications and upon corroborative evidence.

The prerequisites for consideration for this position are: Graduation from a college or university of recognized standing, and at least two years' subsequent experience in practical farming or other agricultural work in the irrigated sections of the Western United States, including the construction and operation of farm irrigation systems on sandy lands in those sections.

Under the second subject special consideration will be given to experience in organizing or directing farmers' cooperative associations and in conducting demonstration work with individual farmers and farmers' organizations.

Under the third subject the applicant must submit with his application a thesis or plan of work dealing with the practical problems involved in the subjugation of sandy lands under irrigation, and the production of crops on such lands, and showing the rela-

tionship which a field representative should have to this work.

Applicants should at once apply for Form 2118, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.; the Secretary of the United States Civil Service Board, Customhouse, Boston, Mass., New York, N. Y., New Orleans, La., Honolulu, Hawaii; Post Office, Philadelphia, Pa., Atlanta, Ga., Cincinnati, Ohio, Chicago, Ill., St. Paul, Minn., Seattle, Wash., San Francisco, Calif.; Old Customhouse, St. Louis, Mo.; Administration Building, Balboa Heights, Canal Zone; or to the Chairman of the Porto Rican Civil Service Commission, San Juan, P. R.

Applications should be properly executed, excluding the medical certificate, and must be filed with the Civil Service Commission, Washington, D. C., with the material required, prior to the hour of closing business on June 22, 1920.

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## MONTHLY PROGRESS REPORTS FOR APRIL.

Monthly conditions of principal Reclamation Service reservoirs for April, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River	Roosevelt <sup>3</sup>	1,305,000	2128	1903	1,402,758	1,391,100	1,402,758		2130.09	2129.4	2130.09
California, Orland	East Park	51,000	1199.68	1111.68	10,572	20,850	20,850	42	1166.45	1178.45	1178.45
Idaho:											
Boise	Arrowrock	280,000	3211	3018	40,080	123,400	123,400	61,866	3086.2	3146	3146
	Deer Flat	177,000	2518	2488	144,348	173,734	175,437	12,694	2514.45	2517.75	2517.82
Minidoka	Lake Walcott	95,180	4245	4236	88,900	93,900	97,500	3,690	4244.46	4244.89	4245.2
	Jackson Lake	847,000	6769	6730	156,320	185,300	185,300		6738.65	6740.14	6740.14
Montana:											
Milk River	Nelson	27,000	2212	2200	22,900	33,000	33,600	10	2210.6	2213.8	2214
St. Mary Storage	Sherburne	33,000	4765	4720							
Sun River	Willow Creek	16,700	4130	4085							
Nebraska-Wyoming, North Platte	Pathfinder	1,070,000	5852	5670	316,60	501,030	501,030	890	5802.82	5817.96	5817.96
	Lake Alice	11,400	4182	4159	4,794	4,220	4,794		4171.9	4170.8	4171.9
	Lake Minatare	67,000	4125	4074	55,065	55,065	55,065		4122.3	4122.3	4122.3
Nevada, Newlands	Lake Tahoe	120,000	6230	6224					6225.11	6225.33	6225.33
	Lahontan	290,000	4162	4060	211,303	207,459	217,700	20,942	4155	4154.5	4155.8
New Mexico:											
Carlsbad	McMillan	45,000	3267.7	3241.6	42,500	21,000	42,500	9,000	3267.3	3262.8	3267.7
Rio Grande	Elephant Butte	2,638,800	4407	4231.5	1,119,057	1,145,325	1,147,427	86,001	4359.15	4359.15	4359.25
Oregon, Umatilla	Cold Springs	50,000	621.5	560	36,900	48,950	48,950		612.18	620.79	620.79
Oregon-California, Klamath	Clear Lake	462,000	4540	4516	310,000	312,000	313,000		4531	4531.2	4531.3
South Dakota, Belle Fourche	Belle Fourche	203,000	2975	2920	154,800	182,790	182,790		2468.4	2972.3	2972.3
Utah, Strawberry Valley	Strawberry	250,000	7558	7517	176,000	180,000	180,000		7547.7	7548.5	7548.5
Washington:											
Okanogan	Concomully	13,000	2287	2232	1,813	2,126	2,126		2254	2255	2255
Yakima	Bumping Lake	34,000	3426	3389	23,345	26,865	26,865		3417.4	3420.5	3420.5
	Lake Cle Elum	22,800	2134	2122	25,600	24,130	25,875	1,745	2134.7	2134	2134.8
	Lake Kachess	210,000	2258	2192	172,565	187,210	187,210		2446.7	2450.2	2450.2
	Lake Keechelus	152,000	2515	2425	97,690	110,670	110,670		2490.8	2497	2497
Wyoming, Shoshone	Shoshone	456,600	5360	5132.3	268,404	254,210	268,404	34,860	5326.5	5323.4	5326.5

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> U. S. storage begins at elevation 6229.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—Water was run in all of the canals during April. The demand for irrigation water was heavy, due to the fact that so much land was prepared and planted to cotton.

During the month part of the maintenance department was engaged in repair and protection of the bank of the Arizona Canal, 2,000 feet below Granite Reef Dam. This work is about 75 per cent complete.

There were six maintenance crews in the field during the month, and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 352; average head of stock, 61; miles main canals cleaned, 30; miles laterals cleaned, 160½; number of new structures installed, 46; number of old structures repaired, 139; riprap placed, 1,175 feet; concrete placed, 44 cubic yards; dry masonry placed, 4 cubic yards; concrete pipe laid, 276 feet; new laterals constructed, 1 mile; waste ditches constructed, 1½ miles.

The Ruth excavator traveled along the south bank of the Western Canal upstream from lateral 3, a distance of 7½ miles, moving approximately 5,657 cubic yards of dirt.

The P. & H. one-half yard dragline was engaged in widening the Eastern Canal and moved approximately 5,000 cubic yards of dirt.

The Marion three-fourths yard drawline was undergoing repairs, and will resume work on the Eastern Canal in a few days.

*Operation of power system.*—The total power generated during the month was 7,691.210 kilowatt hours. The Roosevelt power plant operated continuously during the month. The spillways of the dam discharged water during the entire month. The Cross Cut power plant was operated continuously during the month. The South Consolidated power plant operated 93 per cent, the Arizona Falls operated 99 per cent, and the Chandler power plant 89 per cent.

All of the pumping plants were available for use as needed excepting batteries 5 and 6. The pumps at these plants were being overhauled and put in good condition.

The new Maloney transformer was installed at the Glendale substation and the temporary installation removed.

The Scottsdale distribution lines were completed during the month.

*Construction work, Roosevelt.*—Work was continued on the concrete flume under the roadway at the Roosevelt storehouse.

Work was continued on repairs of the road along the river leading to the power plant.

Work was started getting material and equipment together for the work to be done on the south spillway when the water ceases to flow through same.

**Office.**—The following acreages were entitled to irrigation water service on the first of the month:

	Acreage.	Number of applications.
Permanent..	150,571.25	4,194
Normal flow	1,979.75	573
Temporary.....	18,699.25	99
Town site.....	3,973.75	6
Total.....	195,224.00	4,872

W. R. Elliott, General Superintendent and Chief Engineer.

#### YUMA PROJECT, ARIZONA CALIFORNIA.

Weather conditions during April were good excepting for the prevalence of high winds. Labor conditions were fair.

**Construction.**—On the Yuma Valley drainage system the Bucyrus cleaned about one-half mile of main drain which was being backed up by growth of tules. Work was started on the east drain the latter part of the month; 5,150 cubic yards of material were moved from station 0 to station 6. Piling were driven for a flume at the central canal. Two thousand one hundred cubic yards of material were moved in building a small lateral in the Yuma Valley. Five minor wooden structures were built.

**Operation and maintenance.**—Fourteen thousand acre-feet of water were delivered to approximately 27,000 acres. In the Yuma Valley the Monighan dragline No. 2 moved 4,450 cubic yards of silt from west main canal, station 883 to station 903. The Monighan No. 1 moved 10,000 cubic yards of silt from central canal station 20 to station 60. The V machine cleaned 17.6 miles of small laterals.

In the Yuma Indian Reservation 4 miles of laterals were cleaned by the *Ruth* dredge.

Cotton planting was carried on during the month; a good deal of replanting was necessary owing to damage by the prevailing high winds and cold nights.

Bids for the sale of Mesa lands were opened each Tuesday during the month and 14 tracts containing 190 acres were sold. The second 15 per cent payment on lands sold during the auction sale are being made and \$30,000 have been collected.

The maximum discharge of the Colorado River during the month was 34,000 second-feet, minimum 12,900 second-feet, mean 20,360 second-feet. The gage on April 30 was 17.60 with discharge of 18,300 second-feet. The discharge in acre-feet for the month was 1,211,564.

C. M. Day, engineer, left the project on the 4th, after the completion of tests at the boundary pumping station. C. E. Piatt, examiner of accounts, visited the project from the 20th to the 30th to conduct his regular examination of accounting affairs.—W. W. Schlecht.

#### ORLAND PROJECT, CALIFORNIA.

There were 1.44 inches of rainfall during April, making the total for the season 8 inches, which is about 10 inches below the normal. One inch of the precipitation for the month fell in less than an hour, was local in character, and extended over only about

one-half the project area. All of the flow of Stony Creek was diverted into the irrigation ditches, with the exception of that during the period between the 14th and 19th when the creek reached a maximum discharge of 1,200 second-feet. The total run-off of Stony Creek watershed was about 23,000 acre-feet, 10,000 acre-feet of which occurred above East Park Dam and was added to the storage. The latter part of the month was marked by dry, windy weather, which was reported to have done a great deal of damage to grain throughout the Sacramento Valley, some of the growing grain shriveling and turning yellow through its influence. The amount of water delivered to the land on the project during the month was 4,900 acre-feet, which was used in irrigating 9,000 acres.

The first cutting of alfalfa was made and on the whole was below the average. The outlook for fruit and nut crops was good where orchardists have availed themselves of the opportunity to put their orchards in a good state of cultivation. Grain on irrigated land will yield a good crop, but much of that on dry farm land is likely to be a complete failure.

A force of 28 laborers and 8 head of stock was continued on concrete lining throughout the month, placing 10,000 square yards. No maintenance work was in progress.—A. N. Burch.

#### GRAND VALLEY PROJECT, COLORADO.

The first half of April was much colder than normal and very unfavorable for outside work. During the last half of the month conditions were considerably improved, but the season is about 3 or 4 weeks later than normal, and all spring work is behind schedule. Labor was fairly plentiful for drainage work, which is carried on from town, but much difficulty was experienced in securing sufficient men and teams for the maintenance work.

The project farmers are busy with their spring plowing and seeding. A large acreage of new land is being put under cultivation and the sugar-beet acreage in particular will be materially increased over last season. Beet planting was in progress at the end of the month. The ground, as a rule, is in excellent condition for seeding. Winter wheat is in good condition and alfalfa, in spite of the backward weather conditions, is now making a rapid growth. Last year's hay crop is nearly exhausted and alfalfa is scarce at \$35 per ton in the stack.

The canal lining job in the canyon division was completed on the 10th and water was turned into the main canal on the 11th. There was very little demand for irrigation water during the month, but water was run in all laterals for stock and domestic use. A small break occurred in the main canal near the intake of the East Salt Creek siphon, which interrupted water service below this point for two days until repairs could be completed. Water service for the Palisade district was commenced on the 13th and for the Mesa County district on the 25th. Maintenance forces were busy cleaning laterals, repairing structures, and putting the irrigation system in good condition for the season's operation. The main canal was in good shape, but on account of unfavorable weather since the close of the previous season it was possible to complete only the most urgent work on the laterals.

On the drainage work in the Grand Valley drainage district two drag-line excavators were employed throughout the month. Five thousand one hundred and twenty linear feet of drain were completed, in-



volving 29,000 cubic yards of excavation. The third drag line was loaded on railroad cars at the end of the month for shipment to the lower part of the project, where work will be started on drain to reclaim seeped lands on the project in the section north of Loma. Two canal culverts, one road culvert, and a number of flumes and minor structures were installed in connection with the drainage work.—*S. O. Harper.*

*Prevailing crop prices at close of April, 1920.*

Project.	Alfalfa hay, per ton.		Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	\$20-\$24	\$24-\$30	\$1.50	\$1.08	\$2.10	.....
Yuma.....	25.00	30.00	.....	.....	.....	.....
Orland.....	25.00	30.00	1.80	.....	2.20	.....
Grand Valley.....	35.00	40.00	1.60	1.30	2.55	\$4.20
Uncompahgre.....	15.00	.....	1.50	.90	2.00	3.00
Boise.....	26.00	35.00	1.50	1.40	2.10	6.00
King Hill.....	22.50	27.50	.....	1.16	.....	4.80
Minidoka.....	25.00	32.00	1.75	1.20	2.55	3.90
Huntley.....	.....	.....	.....	.....	.....	.....
Milk River.....	40.00	45.00	1.37	.95	2.86	6.00
Sun River.....	.....	.....	.....	.....	.....	.....
Lower Yellowstone..	30 35	.....	1.50	1.05	3.08	4.00
North Platte.....	17.00	.....	1.30	1.50	2.50	3.00
Newlands.....	21.00	26.00	.....	.....	.....	.....
Carlsbad.....	.....	35.00	.....	.....	.....	.....
Rio Grande.....	.....	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....
Jumping.....	.....	.....	.....	.....	.....	.....
Umatilla.....	.....	35.00	.....	.....	.....	.....
Klamath.....	20.00	30.00	1.40	.93	1.95	.....
Belle Fourche.....	.....	.....	1.85	1.15	2.80	7.20
Strawberry Valley..	.....	45.00	2.50	1.60	3.00	5.10
Okamogan.....	20.00	.....	.....	.....	.....	5.50
Yakima:	.....	.....	.....	.....	.....	.....
Summerville unit..	.....	30-45	.....	.....	.....	3.50
Tieton unit.....	.....	30-45	.....	.....	.....	3.50
Shoshone.....	26.00	30.00	.....	1.44	3.00	3.60
Blackfoot.....	40.00	.....	1.38	1.00	2.83	.....
Flathead.....	.....	.....	2.10	1.15	2.75	4.80
Fort Peck.....	.....	35.00	.....	1.12	2.89	6.00
Riverton.....	20 00	.....	.....	.....	.....	4.00

UNCOMPAHGRE PROJECT, COLORADO.

April weather was cold, stormy, and windy, making it unfavorable for farm and operation and maintenance work. The snowfall amounted to 20.5 inches, and the total precipitation to 2.09 inches, which fell on 12 days.

The price of alfalfa increased from \$12 to \$15 per ton in the stack. Other prices remained about the same.

Fair progress was made by the farmers in plowing and seeding, but all farm work was delayed by weather conditions, so that the amount planted is not up to normal. There will be an unusually large acreage planted to sugar beets, and practically all of the land so planted is in excellent condition. The acreage of potatoes will be reduced considerably on account of the high price of seed and the amount of land being planted to sugar beets.

Owing to the weather conditions the demand for water was much less than normal. Water was carried in all canals and laterals throughout the month, but only a small amount was used for the irrigation of spring wheat.

On account of the wind, it was necessary to clean weeds from the laterals several times. Some repair work was completed. Gravel was crushed at West Portal to provide a supply for future repair work.

The construction of the Stutheit lateral was practically completed, and considerable work was done on the location and right of way of the Miller lateral. During the last few days of the month a careful inspection was made of all metal flumes.—*Fred D. Pyle.*

BOISE PROJECT, IDAHO.

April weather conditions in general were favorable for construction work and farming operations. Winds were prevalent and temperatures ranged below normal. The cool weather retarded plant growth and delayed planting to some extent. The precipitation during the month was slightly above the mean for the past 57 years.

*Labor conditions.*—Additional highway work was begun during the month; this, together with the increase in building and farm work, called for additional men and teams. The supply was not sufficient to meet the requirements and full crews could not be maintained. There was a general increase in the wage scale but this did not materially relieve conditions.

*Farming operations.*—Seeding of small grain and grasses was completed and a large acreage was planted to potatoes. The corn ground was prepared but planting was not begun. In the orchards pruning was completed and spraying was begun.

Due to the late spring which retarded growth of grass on the ranges some live stock was still in the feed lots. By the last of the month the supply of hay was about exhausted and the remaining herds were moved to summer range.

Some alfalfa was baled and shipped. The price rose to \$35 per ton f. o. b. cars, with only a small amount available.

From the 20th of the month irrigation of meadows and pastures became general.

*Water supply.*—The precipitation for the month was in excess of the normal by 0.14 of an inch. There is still a deficiency for the year, however, of 1.71 inches. The total discharge of the Boise River during April was 194,980 acre-feet as compared with the mean for the past 26 years of 379,036 acre-feet. The low run-off was due to cool weather, which retarded the melting of the snow in the higher mountains. The snow in the mountains is reported somewhat below normal, but contains a high percentage of moisture. Unless the weather turns unusually warm during May the flow of Boise River will probably hold up well into the summer.

The storage in Deer Flat Reservoir was above that of any previous year. Arrowrock Reservoir was somewhat below normal but the indications are that there will be ample flood water to fill it.

*Operation and maintenance.*—The Main Canal was operated during the entire month. For the first 15 days the water was stored in Deer Flat Reservoir. After that date the demand for irrigation heads became general. By the end of the month the entire distribution system was in operation.

Two bad breaks occurred on the lower end of the Deer Flat Lowline Canal and a number of breaks were caught on the canals and laterals before any damage was done. These were all traced to gophers, which are unusually numerous this season. A united effort is being made to rid the project of these pests.

Canal cleaning was completed early in the month. Several small crews were engaged in the replacement of wooden structures that have rotted out and in the repair of larger structures.

**Construction.**—On the Notus Canal a small crew was engaged in cleaning up the work on the suspended contract of Wm. Long and on the installation of minor structures where the canal had interfered with private laterals. In the cultivated areas of the project several tap boxes and weirs were installed to take care of new lands.

**Drainage.**—Two dragline excavators continued work on the drainage system in the Big Behd and Riverside irrigation districts. One crew was employed on this work on the installation of structures at canal and highway crossings. Good progress was made both on the excavation and structure work.

**Surveys.**—Lines and grades were given for the construction and drainage work in progress. Two men were employed on the classification of lands as to the irrigable area, in staking out miscellaneous structures, and in making surveys for small laterals.

**Visitors.**—F. E. Weymouth, chief engineer, and Judge Will R. King, chief counsel, visited the project during the month.—*J. B. Bond.*

#### Project weather during April, 1920.

Project.	Station.	Temperature, F.			Precipitation (inches).
		Maxi-mum.	Mini-mum.	Mean.	
Salt River.....	Phoenix, Ariz.....	94	42	64.6	.....
Yuma.....	Yuma, Ariz.....	94	40	67.6	.....
Orland.....	Orland, Calif.....	90	37	58.6	1.44
Grand Valley.....	Grand Junction, Colo.....	89	14	46	1.09
Uncompahgre.....	Montrose, Colo.....	74	9	41.3	2.09
Boise.....	Boise, Idaho.....	67	21	45.5	1.32
King Hill.....	Glenns Ferry, Idaho.....	74	22	45.9	.14
Minidoka.....	Burley, Idaho.....	66	14	41.9	1.64
Himlay.....	Ballantine.....	67	13	38.1	1.39
Milk River.....	Malta, Mont.....	62	7	36.7	2.19
St. Mary storage.....	Near Babb, Mont.....	60	-8	31.5	3.28
Sun River.....	Fort Shaw, Mont.....	64	2	36.8	2.64
Lower Yellowstone.....	Savage, Mont.....	66	5	35	2.04
North Platte.....	Wyncote, Wyo.....	68	-7	36.9	4.34
Newlands.....	Fallon, Nev.....	.....	.....	.....	.....
Carlsbad.....	Carlsbad, N. Mex.....	89	21	.....	.....
Rio Grande.....	El Paso, Tex.....	85	36	60.1	.03
North Dakota pumping.....	Williston, N. Dak.....	57	-3	36	.86
Umatilla.....	Hermiston, Oreg.....	82	29	50	1.71
Klamath.....	Klamath Falls, Oreg.....	73	18	43.5	1.61
Belle Fourche.....	Orman, S. Dak.....	65	9	39.4	3.38
Strawberry Valley.....	Provo, Utah.....	73	20	43.7	2.46
Okanogan.....	Omak, Wash.....	83	20	48.3	1.41
Yakima.....	.....	.....	.....	.....	.....
Sunnyside unit.....	Sunnyside, Wash.....	84	22	48.5	.8
Tifton unit.....	Cowiche, Wash.....	78	19	45	.48
Shoshone.....	Powell, Wyo.....	62	10	6	.06
Indian projects:	.....	.....	.....	.....	.....
Blackfoot.....	Browning, Mont.....	57	-2	29	1.33
Flathead.....	St. Ignatius, Mont.....	66	17	41.2	2.54
Fort Peck.....	Poplar, Mont.....	64	3	35.3	.63
Riverton.....	Pavillion, Wyo.....	64	8	36.6	1.03

#### KING HILL PROJECT, IDAHO.

The weather during April was favorable for construction work, though cold for this season of the year. Labor was plentiful. The semiprecast concrete flume was completed on the 18th and the combination gunite and concrete flume on the 21st. During the latter part of the month a small force of men was employed at Camp 5, cleaning up along the flume

bench and getting the camp ready to close down for the summer season.

Water was turned into the canal at the head end on the 3d, but was not turned through the new structures, constructed from Camp 5, until the 22d.

Two engineering field parties were employed during the latter part of the month running bench-level lines and collecting data to be used in preparing estimates and designs for structures to be built during our next construction season.

The office engineering and clerical forces were employed on routine work. The office engineering force completed a report on duty of water.

The operation and maintenance forces, working under the King Hill irrigation district management, were busy during the forepart of the month in getting the canal ready for delivery of water, and with the delivery of irrigation water during the latter part of the month.

F. E. Weymouth, chief engineer, visited the project on the 22d and 23d.—*H. R. McBirney.*

#### MINIDOKA PROJECT, IDAHO.

On the South Side pumping unit delivery of water was carried on the entire month of April, but due to the late spring the demand for water was not heavy. Three maintenance crews, consisting of between four and five men each, were engaged removing weeds, ripping the main South Side gravity canal, repairing and replacing structures, and removing sand from laterals. Due to the heavy winds several laterals were blown full of sand. Water was delivered through the "J" canal beginning on the 4th.

The reclassification of the irrigable acreage on the South Side pumping unit was begun on April 20 and continued until the 28th. A total of 31,500 acres was examined during the above period. The office work in connection with the reclassification of the irrigable acreage on the gravity unit was begun on the 28th. A topographic party of five men started work at American Falls to make topographic survey for the location of a town site to which the present town could be moved provided work is started on the American Falls Reservoir.

In connection with the board of engineers appointed to investigate the feasibility of the construction of the American Falls Reservoir and other projects in Snake River Valley, the following men were in attendance: I. W. McConnell, engineer and vice president of the Dwight P. Robinson Co. of New York; F. W. Hanna and James Munn, consulting engineers for the U. S. Reclamation Service; J. C. Wheelon, manager of the Twin Falls Canal Co.; E. B. Darlington, chief engineer of the North Side Canal Co.; W. G. Swendsen, State commissioner of reclamation; Myron Swendsen, Paul S. A. Bickel, I. B. Perrine; Dana Templin, manager of the Minidoka irrigation district; Ern G. Eagleson, mayor of Boise, Idaho; D. W. Davis, governor of Idaho; W. H. Tremmer, chief engineer of the Idaho Power Co.; Mr. Sanger, construction engineer of the Idaho Power Co.; and a number of others.

A meeting of canal officials, in and around Idaho Falls, and others interested in the purchase of storage in the American Falls Reservoir, was held at Idaho Falls on April 21. A motion was made, seconded and unanimously carried, that final contracts for the purchase of American Falls storage should be signed and the initial payment of 10 cents per acre-foot made on or before June 1, 1920.—*Barry Dibble.*

(Crop reports on pp. 284 and 285.)



## HUNTLEY PROJECT, MONTANA.

April weather conditions were unsettled and only a small amount of the proposed field work could be accomplished.

A check on the main canal below lateral F. G. L. was partly completed, the steel being placed and concrete for the floor run. Bad roads made it impossible to haul material with which to complete the work.

About 75 feet of rock riprap below McCaffery check on the main canal was taken out and is being replaced with grouting.

Some canal protection work was done below the Osborn check by plowing down and rebuilding the banks preparatory to placing temporary wire netting and weed protection to prevent bank erosion.

Laterals in divisions 4 and 5 were nearly all cleaned and prepared for the delivery of water.

All tile drains were gone over, trap boxes cleaned and repaired, and breaks in tile noted.

The damage to the main canal caused by Fly Creek during the March flood was repaired and the main canal was in condition to operate.

On the Highline extension a new cut-off comprising 2,700 cubic yards of excavation was begun and practically completed. The material encountered was unusually hard, and required loosening with powder before it could be successfully handled.

Contract has been let for the construction of a gravel road between Billings and Ballantine, the project headquarters. The highway engineers have completed their field work and actual construction will be started at an early date.

Little spring plowing and practically no seeding had been done by the end of the month. Winter wheat is coming on slowly and is reported to be in excellent condition.

Mr. Chas. P. Williams, assistant chief engineer, visited the project on the 21st and 22d, and Mr. J. L. Burkholder, drainage engineer, on the 26th and 27th.—*Wm. M. Greer.*

## MILK RIVER PROJECT, MONTANA.

April weather was abnormally cold and wet. Precipitation was 2.19 inches, the largest on record for April since the station was established in 1905 and 1.59 inches above normal. Climatic conditions were unfavorable for both construction and farming operations. Little, if any, plowing and seeding was accomplished. Labor was very scarce and the wages high.

The Dodson South Canal was operated from the 1st to 22d and the filling of Nelson Reservoir completed by the delivery of 8,500 second-feet of water. After filling the Nelson Reservoir, some water was delivered into Bowdoin Lake. The Dodson North Canal was operated from the 17th to the end of the month, at first for sluicing operations, and on the 26th the first

*Crop report Minidoka project, Idaho, gravity unit, year of 1919.*

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	28,876	Ton.....	108,597	3.8	17.00	\$1,846,149	63.93
Alfalfa seed.....	119	Bushel.....	313	2.9	15.00	5,145	43.24
Apples.....	284	do.....	10,754	37.9	1.50	16,131	56.80
Barley.....	756	do.....	23,785	31.5	1.35	32,110	42.47
Beans.....	66	do.....	674	10.2	4.20	2,831	42.89
Beets, sugar.....	4,567	Ton.....	35,649	7.8	10.00	356,490	78.06
Clover seed.....	1,184	Bushel.....	5,156	4.4	28.00	144,368	121.93
Clover hay.....	488	Ton.....	1,024	2.1	17.00	17,408	35.67
Corn.....	688	Bushel.....	22,374	32.5	1.5	33,561	48.78
Corn fodder.....	97	Ton.....	525	5.4	10.00	5,250	54.13
Garden.....	611	do.....	do.....	do.....	do.....	42,808	70.06
Hay.....	280	Ton.....	506	1.8	17.00	8,602	30.72
Mangels.....	8	do.....	66	8.3	5.00	330	41.25
Millet seed.....	3	Bushel.....	36	12.0	5.00	180	60.00
Oats.....	2,971	do.....	96,188	32.4	1.00	96,188	32.38
Onions.....	3	do.....	833	238.0	3.00	2,499	714.00
Pasture.....	5,144	do.....	do.....	do.....	do.....	98,289	19.11
Pears.....	47	Bushel.....	697	14.8	3.00	2,091	44.49
Potatoes.....	1,769	do.....	276,472	156.0	0.96	265,413	150.04
Peaches.....	1	Pound.....	2,500	5,000.0	0.04	100	200.00
Prunes.....	4	do.....	1,600	400.0	0.03	48	12.00
Rye.....	220	Bushel.....	2,382	10.8	1.90	4,526	20.57
Small fruit.....	33	Pound.....	54,050	1,638.0	0.03	1,622	49.15
Wheat.....	7,581	Bushel.....	206,438	27.2	1.85	381,910	50.38
Miscellaneous.....	1,585	do.....	do.....	do.....	do.....	do.....	do.....
Less duplicated areas.....	317	do.....	do.....	do.....	do.....	do.....	do.....
Cropped.....	57,068	Total and average.....	do.....	do.....	do.....	3,364,049	58.95
Nonbearing orchard.....	154	do.....	do.....	do.....	do.....	do.....	do.....
Young alfalfa.....	1,816	do.....	do.....	do.....	do.....	do.....	do.....
Miscellaneous.....	621	do.....	do.....	do.....	do.....	do.....	do.....
Less duplicated areas.....	400	do.....	do.....	do.....	do.....	do.....	do.....
Total other purposes.....	2,191	Irrigable area farms reported.....	71,886	1,479	99.3	do.....	do.....
Total irrigated.....	59,259	Irrigated area farms reported.....	59,259	1,479	81.8	do.....	do.....
		Under water-right application.....	59,259	1,479	81.8	do.....	do.....
		Cropped area farms reported.....	57,068	1,479	78.8	do.....	do.....

NOTE.—Of the 57,068 counted above as total cropped, 491 acres yielded nothing due to destruction by predatory animals.

water delivery of the season was made to an irrigator. None of the other canals was operated during the month.

Maintenance work consisted of repairs to various structures, brush and rock revetment on some of the canal banks, painting metal flumes, and sluicing slides from the Dodson North Canal. The ground was too wet for cleaning silt from canals and laterals or the construction of new laterals by team methods.

The little construction work attempted comprised the placing of several wooden checks, measuring devices, and turnouts on the various canals and laterals, completion of the erection of the flumes on the Dodson North Canal, and miscellaneous small items. Two small earthwork contracts were executed.

By the Secretary's order of April 3, 21 farm units were opened for entry on a rental basis. From April 30 to June 30 these farm units are open only to officers, soldiers, sailors, and marines who served in the war with Germany. On and after June 30 any of the farm units then remaining vacant will be open to entry by any qualified entryman. On April 30 requests had been received from 35 individuals for water rental applications on 18 of the 21 units.

A hearing before the International Joint Commission will be held at Ottawa, Canada, on May 3 for the final reargument of the matter of the measurement and apportionment, under the treaty of January 11, 1909, of waters of the Milk and St. Marys Rivers between the United States and Canada.

Mr. F. G. Hough, examiner of accounts, visited the project on the 30th.—*Geo. E. Stratton.*

#### ST. MARY STORAGE UNIT.

April weather conditions were unsettled. Few days were free from storm and the snow and mud made it

extremely difficult to accomplish anything on construction or maintenance work.

The erection of the second barrel of Spider Coulee flume was continued. At the end of the month about 95 per cent of the timberwork was completed and about 25 per cent of the steel placed.

Maintenance work was confined to repairs at St. Mary crossing pressure pipe.

Due to the snow during the month the indications are that the natural flow of Milk River will be sufficient for irrigation requirements during May and the early part of June, so it will not be necessary to operate the St. Mary Canal until late in the season.

*R. M. Snell.*

#### LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

April weather conditions were unfavorable for either maintenance work or farming operations. There were 2.4 inches of precipitation, which was 2.3 times the normal. The mean temperature was 35°, the lowest for 13 years, and 9° below normal. There were only 12 clear days during the month.

Practically the only farming work carried on thus far this season has consisted of burning weeds and a little plowing on some of the comparatively sandy tracts. The ground has been not only too wet for farming operations, but in many shady places ice was still remaining and frost can be encountered within a few inches of the surface.

The maintenance crew has been very small as the unfavorable weather conditions have prevented outside work and it is anticipated that after weather and ground conditions become favorable there will be a great shortage of help. On district No. 1 a small crew started on the 19th at repairing the unstable water bank at Indian Coulee. At this place the lower

#### Crop report, Minidoka project, Idaho, South Side pumping unit, year of 1919.

Crop	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	17,689	Ton.....	49,543	2.8	\$17.00	\$842,231	\$47.61
Alfalfa seed.....	47	Bushel.....	94	2	15.00	1,410	30.00
Apples.....	22	do.....	2,003	91	1.50	3,004	136.54
Barley.....	353	do.....	9,290	26.3	1.35	12,542	35.53
Beans.....	39	do.....	246	6.3	4.20	1,033	26.48
Bee's.....	3,850	Ton.....	28,222	7.3	10.00	282,220	73.50
Clover.....	201	do.....	278	1.3	17.00	4,728	23.52
Clover seed.....	1,079	Bushel.....	2,281	2.1	28.00	63,868	59.19
Corn.....	17	do.....	556	32.7	1.50	844	49.06
Corn fodder.....	33	Ton.....	213	6.4	10.00	2,130	64.54
Fruits, small.....	5	Pounds.....	2,635	527	.03	79	15.80
Garden.....	328	do.....	469	2.7	18.00	26,491	80.76
Hay.....	171	Ton.....	42,422	28.1	1.00	8,442	49.36
Oats.....	1,507	Bushel.....	53,760	35.7	3.00	42,422	28.15
Pasture.....	1,981	do.....	1,140	0.57	1.90	53,760	27.13
Peas.....	39	Bushel.....	380	9.7	1.90	1,140	29.23
Potatoes.....	3,846	do.....	819,597	213.1	1.85	737,637	191.79
Rye.....	28	do.....	453	16.2	1.85	861	30.75
Wheat.....	10,527	do.....	256,864	24.4	5.00	475,198	45.14
Mangels.....	26	Ton.....	436	16.7		2,180	83.84
Less duplicated areas.....	8						
Cropped.....	41,780		Total and average			2,562,210	61.42
Nonbearing orchard.....	243		Areas.		Acres.	Number of farms.	Per cent of project.
Young alfalfa.....	82					874	98
Fall plowed.....	144					874	92
Miscellaneous.....	2,751					874	92
Total other purposes.....	3,220				48,301	874	85
Total irrigated.....	45,000				45,000	874	
					41,780	874	



half of the canal bank was removed with a drag-line excavator in December, 1919, and the back filling is consisting of screened gravel. In addition to this porous back filling, 250 feet of wooden drains have been placed. A small crew has been engaged the greater part of the month in overhauling the drag-line machines preparatory for cleaning silt from the main canal as soon as the material is free from frost. On district No. 2 the maintenance crew has likewise been small. They have, however, been working to good advantage at constructing wooden turnouts, repairing equipment, and at the end of the month had nearly completed three concrete drops and assembled 58 wooden turnouts.—*L. H. Mitchell.*

#### NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

April weather was unusually cold and stormy and unfavorable for both construction work and farming operations. Two big storms occurred, one on the 3d and one on the 17th, 18th, and 19th. The latter was the hardest blizzard of the season, about 1½ feet of snow falling accompanied by high winds. The roads became impassable and train service was delayed from 24 to 48 hours. The mean temperature for the month was the coldest recorded in the project records, being 8.8° below the normal of April.

*Operation.*—On account of the weather conditions and the large amount of moisture in the soil, no water was required for irrigation. The first 25.5 miles of the Fort Laramie Canal were operated to furnish water for the Lingle power plant.

*Maintenance.*—Very little of the usual spring work could be accomplished on account of the weather and the snow left in the canal and laterals. Some lateral cleaning was done in favorable localities and some work done on the replacement of wooden structures with concrete.

Dragline No. 4 continued work on the Interstate Canal banks near mile 31. During the month 6,425 lineal feet of bank were strengthened and canal section enlarged involving the moving of 14,178 cubic yards of material.

After about 430 lineal feet of canal had been enlarged, the work with the dredge was discontinued on account of lack of funds and the machine removed from the canal.

On the afternoon and night of the 10th, an unusually high wind occurred, coming from the northeast and causing the waves on Lake Minatare to reach a height of from 4 to 7 feet and creating a terrific pounding action on the concrete paving on the face of the dam. As a result, during the night a section of the paving was undermined, causing a washout near the center of the earth dam about 150 feet long and extending from 3 feet below water level to about 10 feet above. Temporary repairs were effected by the construction of a breakwater, using the broken pieces of slabs and back filling with gravel and paving on top of the gravel with cement sacks filled with gravel. The permanent repairs will be made after the water has been lowered during the irrigation season.

At the Pathfinder Dam repair plates to admit air to the throat of the balanced valve in outlet No. 1 of the south tunnel, were installed.

*Crops.*—On account of the very backward spring weather farming operations have been very much delayed and very little work was accomplished except in a few favored localities. Practically all of the last season's crop has been moved and there is

an apparent shortage, especially in the hay and forage crops.

*Live stock.*—There was considerable movement of sheep and cattle to the markets during the month, approximately 20,000 sheep and 2,000 cattle being shipped out. The shippers report satisfactory profits on sheep but losses on cattle.

*Drainage.*—On the Interstate unit work was continued on the Lower Nine Mile outlet drain, the principal work being the removal of the concrete flume which had been constructed to carry the Bayard Canal across the drain. Drag line No. 2 was used to excavate around this structure and 1,400 pounds of T. N. T. were used in demolishing it. The drag line was used to clear the site after the explosion. Other work was delayed on account of the weather. Preparations for work on the Winters Creek closed drain were discontinued on account of lack of funds. Monaghan drag line No. 3 which is leased to the Mitchell drainage district, continued work on the enlargement of the Mitchell drain.

On the Fort Laramie unit electric drag line No. 2 continued work on the Cherry Creek drain, working with two shifts daily until the 13th, when an end casting on the equalizer beam was broken. Repairs had not been received at the end of the month. During the working period this machine excavated 0.32 mile of drain and moved 12,038 cubic yards of material. The highway bridge over the drain at station 387 was completed.

*Construction.*—Progress on all construction work was delayed by the weather and bad road conditions.

*Storage unit:* The installation of the plant for the construction of the new North Tunnel outlets was completed and tested. The lower gate shaft was timbered and the guides installed. A bulkhead was constructed in front of the North Tunnel gates and drilling begun on the excavation for the seat for the plug to be constructed in the tunnel.

*Interstate unit:* Progress on the construction of the five-room cottage in Mitchell for the use of the district counsel was delayed on account of weather conditions and the delays in the delivery of material.

*Fort Laramie unit:* Electric drag line No. 1 continued work on the lower end of the Springer lateral, operating with two shifts daily when the weather permitted. During the month this machine excavated 2.12 miles of 8-foot base lateral involving the excavation of 28,310 cubic yards of class 1 and 1,430 cubic yards of class 2 material. Drag line No. 3 continued work on the excavating of the Fort Laramie Canal between stations 4666 and 4658, operating with two shifts daily during favorable weather. During the month 24,620 cubic yards of class 1 and 13,266 cubic yards of class 2 material were excavated. Drag line No. 5 continued work on the Horse Creek lateral between station 2 and station 22, excavating 27,550 cubic yards of class 1 and 1,400 cubic yards of class 2 material. Drag line No. 4 was cleaned up and is ready to move to the lower end of the Horse Creek lateral as soon as weather conditions permit.

During the month the powder crew of five men drilled 1,340 lineal feet of holes and used 45 pounds of dynamite and 2,730 pounds of T. N. T. in blasting classified material ahead of drag lines No. 3 and No. 5.

Progress on the construction of structures on the Cherry Creek lateral system was slow. Turnout gates were installed for sublaterals at miles 4, 9, 6, 1, 7, 2, 8.0 and 9.0, and the highway bridge at mile 4.5 was completed. Some work was accomplished on the excavation for minor structures.

The excavation of the check in the Fort Laramie Canal at mile 45.1 was completed and the structure started. Cast-iron gates were installed at the canal turnouts at miles 41.3, 41.8, and 58.7.

Northport district: Work was continued by the Government forces on the excavation of schedule 1 of the Northport Canal, but progress was slow on account of weather conditions. Some work was done on the turnout structures. Good progress was made on the construction of the permanent camp at Indian Creek.

**Power-house operation.**—The Lingle power plant was operated continuously throughout the month with three shifts daily. No difficulties were encountered. Contracts were approved for the sale of electrical power to the city of Mitchell and the village of Morrill and construction of the necessary transmission lines will begin at once.

*Surveys, Interstate unit.*—The drainage field party was employed on the survey on the lower 9-mile outlet drain and on the Spottedtail outlet channel.

**Fort Laramie unit.**—On account of weather conditions, little field work was accomplished with the exception of routine work in connection with the drag-line operations. Some work was done during the first of the month on the final location of the Fort Laramie canal in Nebraska.

*Northport district.*—No field work was done except furnishing lines and grades for construction work.—*H. C. Stetson.*

## NEWLANDS PROJECT, NEVADA.

April weather was quite windy, which, accompanied by cold nights, prevented fruit trees and crops from becoming so far advanced as to be damaged by later frosts.

On April 3 the project water users were addressed by Gov. Emmett D. Boyle, who discussed and advocated the construction of a project deep-drainage system.

Probably one of the most notable events in the history of the project occurred on April 6, when the members of the local irrigation district voted in favor of the service constructing a deep-drainage system. The result of the election stood 444 votes for and 87 against drainage. Mr. Thomas Williamson was elected as the new member on the board of directors of the irrigation district to succeed Mr. C. E. Coe, who retired. Mr. Coe had been secretary of the organization.

From April 9 to 12 Drainage Engineer J. L. Burkholder visited the project to make a preliminary outline of drainage plans.

From April 12 to 14 Mr. Allen C. Joy, inspector, visited the project.

From April 23 to 27 District Counsel E. W. Burr was on the project attending to legal matters.

On April 24 District Counsel R. M. Patrick returned from Boise to complete unfinished legal business before leaving the project permanently to assume a new assignment in Idaho.

**Construction.**—Only a small amount of structure work on the "S" lateral system to provide delivery of water to the Freeman Ranch was done during the month, this work having been largely completed previously.

Several short new laterals were constructed and several miles of old laterals, which have never been operated, were reconstructed, with the exception of placing of structures, for the service of lands recently placed upon the farm unit plats.

Work of installing new timber and steel check structure in the Truckee Canal at station 700± was completed.

Excavation of the J<sub>1</sub> Drain in the Carson Lake tract continued with dragline No. 4 in operation.

Seven minor timber structures were installed in the Downs lateral and drain by Government forces. Excavation of these ditches was completed early in the month by contract work.

*Crop report, Newlands project, Nevada, year of 1919.*

Crop.	Area (acres).	Unit of yield.	Yields.		Values.			
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.	
Alfalfa.....	24,188	Ton.....	92,850	3.84	\$16.00	\$1,485,600	\$61.44	
Barley.....	519	Bushel....	10,875	20.95	1.45	15,769	30.38	
Garden and miscellaneous crops.....	701					42,271	60.30	
Oats.....	31	Bushel....	937	30.25	.90	8,433	27.22	
Potatoes.....	152	Bushel....	24,367	160.30	1.50	36,558	240.46	
Wheat.....	5,423	Bushel....	83,267	15.35	2.00	166,534	30.70	
Hay (grain).....	351	Ton.....	345	0.98	15.00	5,175	14.74	
Alfalfa (seeded 1919).....	3,854	Ton.....	817			13,072	3.40	
Pasture (wild grass).....	10,247					23,914	2.33	
Pasture (alfalfa after cutting).....						43,327		
Less duplicated areas.....	2,170							
Cropped.....	43,296	Total and average.....					1,840,650	156.59
		Areas.		Acres.		Farms.	Per cent of pro- ject.	
Acreage irrigated, without crop.....	1,028	Irrigable area farms reported.....		62,105	694	32.30		
Less duplicated areas.....		Irrigated area farms reported.....		44,324	694	23.10		
Total other purposes.....	1,028	Cropped area farms reported.....		43,296		22.50		
Total irrigated.....	44,324							

<sup>1</sup>Crops in full production.



Three minor structures were placed in the Schaffer lateral.

Twenty other minor timber structures were installed in various laterals during the month.

The project shops were operated on dragline, tractor, and miscellaneous equipment repairs.

On April 24 bids were opened for the excavation of the Tucker, Lawrenz, Bell, and Harding laterals. Fourteen bidders entered proposals. Awards were made to five bidders. Unit bid prices under the awards ranged from 14 to 19 cents per cubic yard. About 14,000 cubic yards of excavation are involved.

Four of the five tractors owned by the Service were rented by private interests for land-leveling operations.

Surveys as required in connection with the construction work in progress or to be undertaken were made.

*Settlement.*—Numerous inquiries concerning project lands continued to come in. During April, 10 homestead filings, covering 809 acres, and 1 private land water-right application covering 68 acres were accepted.

*Water supply and use.*—Storage in Lahontan Reservoir increased about 10,000 acre-feet during April, the increase being less than would have been the case had it not been necessary to shut the water out of the Truckee Canal in order to install a check structure in the same near Fernley.

The irrigation season for 1920 started early in the month and the use of water increased until at the end of April about 235 second-feet in the Truckee Canal and 900 second feet in the "V" and "T" canals was being delivered.

*Operation and maintenance.*—Practically all of the canals and laterals have been placed in serviceable condition.

Owing to the necessity of shutting water out of Truckee Canal to permit placing check structure near Fernley, the Lahontan power plant was operated from the reservoir after April 15.

About 12 miles of laterals were cleaned during the month. The Sagouspe-Vencil ditch, an old private ditch taken over by the operating department, was reconstructed over a length of about 1 mile. About one-fourth mile of this was new work.

Dragline excavator No. 3 completed strengthening the south bank of the "S" Canal near the sugar factory, a length of about 3,000 feet being worked over during the month.

This excavator was then moved to the head of the "LB" lateral. This lateral was cleaned and the banks were raised for a distance of about 1,000 feet.

Reconstruction of the Leeteville-Carson Dam telephone line, commenced during March, was completed.

Thirteen minor timber structures were installed and 15 timber structures were enlarged or repaired.—*John T. Richardson.*

#### CARLSBAD PROJECT, NEW MEXICO.

*Operation and maintenance.*—Water was in the canal during the entire month of April, and was being used for the irrigation of alfalfa and in the preparation of land for cotton planting, which was in progress during the entire month. Owing to the large acreage of additional land being planted to crops, the demand for water was very large. The average diversion into the main canal was about 950 acre-feet per day. Two forces of men under the direction of the regular foreman and one subforeman completed the regular cleaning work and repairing of ditches

and building and repairing small structures. About one week was spent in installing a gaging station on the Pecos River about 2 miles below the mouth of Black River; this station was installed under the co-operation of the State engineer's office.

The weather was cold and extremely windy during the entire month. Alfalfa made very little growth; some plantings of cotton which were in the ground early in April had to be replanted at the end of the month, it being too cold to germinate the seed. There was no precipitation during the month. The run-off of the Pecos River at the Dayton station averaged 312 acre-feet per day, or 9,660 acre-feet for the month. Owing to the heavy draft on the reservoir and the relatively small amount reaching the project, the storage was heavily drawn on during the month.

Good progress was made in preparing land and planting cotton; the planting was about 70 per cent completed at the end of the month. Although considerable land was prepared ready to plant early in the month, very little of the cotton crop was planted until after the 15th. The early plantings of cotton were just beginning to come up at the end of the month; prospects are for a good stand. More work was done on the farms in the preparation of land for planting and better methods employed than ever before in the history of the project. The acreage planted to cotton will be large. Alfalfa made a very poor growth during the month and in most cases will have to be irrigated the second time before harvesting. The first crop is likely to be light. Practically all of the cotton and alfalfa for sale had been shipped from the project, although there are a few lots of cotton still on the port markets unsold.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

April was one of the coldest on record, the temperature averaging 3.7° below normal, and there being only two years since 1879 when the month had a lower mean temperature.

Large damage resulted to the peach crop, but the pear crop now seems to be injured less than was originally expected, and may produce half a full crop.

Much activity during the month was shown on the farms, as indicated by the comparatively large demand for irrigation water, 34,600 acre-feet of water were applied to about 52,000 acres of project land, as compared with 19,300 acre-feet to 31,300 acres in 1919. Much of this activity was due to preparation for cotton planting, which is receiving a general popular interest, due to the pronounced success of those who grew cotton last year. Cantaloupe and truck gardening in the Mesilla Valley is taking on an increasing acreage.

On the 1st of April the La Union irrigation canal was taken over and is now being operated by the Reclamation Service.

New county farm bureau agents assumed their duties during April; J. B. Peterson, of Dona Ana County, N. Mex., and H. C. Stewart, of the El Paso County Farm Bureau, Tex.

Construction progressed during the month principally on the drainage feature. However, considerable lateral work was accomplished. In the Rincon Valley the 1 T Monighan excavator, working two shifts, excavated 17,594 cubic yards in 1,235 feet of drain. In the Mesilla Valley the five Government machines excavated 109,178 cubic yards in 11,065 feet of drain, and 8,127 cubic yards in 4,235 feet of lateral, while

the contractor excavated 35,983 cubic yards. Other lateral construction and reconstruction by teams amounted to 7,200 cubic yards in 9,000 feet of ditch. On the 25th No. 9 excavator crossed the railroad at Mesilla Park where a pile trestle is being installed by the railroad company for the drain crossing.

In the El Paso Valley one Bucyrus drag-line excavator removed 44,635 cubic yards in 4,115 feet of drain, and the other machine excavated 17,905 cubic yards in 4,700 feet of the Island main lateral extension.

Allen P. Joy, inspector, visited the project during the early part of April.

C. E. Platt, examiner of accounts, completed his work on the project and left on April 14 for Yuma, Ariz.

On April 21, L. C. Cunningham, a truck driver out of Las Cruces, was instantly killed when his truck was struck by a freight train.—*L. M. Larson.*

#### NORTH DAKOTA PUMPING PROJECT.

The weather during April was unusually cold with not more than five days suitable for canal maintenance work. As the month closed snow was still in some of the canals and in the coulees along the Little Muddy Valley. The Missouri River and Little Muddy Creek remained unusually high for about 10 days after the ice broke up, and the upper Little Muddy Creek did not break up until the latter part of April, which made access to the power plant very difficult and hampered the delivery of freight and supplies.

In the coal mine entries were driven to the extent that 24 rooms can be opened for irrigation season operations. Water came into the mine from a number of sources hitherto unknown and made extra work and new difficulties of operation. About 900 tons of coal were mined.

The power plant was operated for the commercial power contract; 72,340 kilowatt-hours of electrical energy were delivered to the city of Williston, which represented a decrease of 33,231 kilowatt-hours from the last month and a decrease of 6,345 kilowatt-hours for the same month of last year.—*A. R. Barbour.*

#### UMATILLA PROJECT, OREGON.

The total rainfall for April was very much above normal and was of great benefit to the project; not only was the water supply materially helped but new seedings of alfalfa were practically saved, as much of the project was not being irrigated, due to the betterment work on Canal A. Temperatures and wind movement conditions were normal. Precipitation for the month was 1.86 inches, and the average rainfall for this month for the previous 11 years 0.81 inch. A total wind movement of 4,524 miles was recorded.

*Farming operations.*—There was a great deal of activity, involving the leveling and seeding to alfalfa of new lands. Shipments were light. Ten cars of baled and chopped alfalfa hay were shipped and several less-than-car-load shipments of apples, honey, bees-wax, and hides.

*Labor.*—Labor conditions on the project were not easy. The work on Canal A was expedited through the volunteer work of settlers. The month's work was seriously handicapped and the operation season begun under considerable difficulties.

*Operation and maintenance.*—The feed canal was operated throughout the month, diverting from 126 to 300 second-feet. From 202 to 261 second-feet were delivered to the reservoir and 25 second-feet to the Echo Mills continuously throughout the month. Because of a large gravel bar which had formed in front of the diversion gates while the river was in flood difficulty was had at times in maintaining a satisfactory head. On April 29 delivery of water to Canal A from the feed canal over the by-pass was begun. It is hoped to meet the demands for irrigation in this manner until the betterment work near the head of Canal A is completed, which will probably be about May 15. Storage conditions improved rapidly throughout the month, over 12,000 acre-feet being stored. At the close of the month 48,959 acre-feet had been stored in Cold Springs Reservoir. The Maxwell Canal was operated throughout the month, diverting from 25 to 90 second-feet. Water was out of the canal on April 28 for 11 hours because of a break.

Conditions under the Maxwell Canal were very favorable. Under Canal A, however, new seedings and mature crops on the sand hills were suffering. It is hoped that by means of by-passing the water from the feed canal to Canal A a minimum amount of crop loss will be suffered.

Water-supply conditions improved steadily throughout the month, and the project is now provided with an ample supply for the season. Unless the demands for water should prove too heavy, the reservoir will be completely filled by the 10th of May. Should more rain fall in the month it is possible that water-supply conditions may even prove to be exceptional.

Four small crews have been employed throughout the month on maintenance work. Cleaning of canals and laterals and repairs to structures, cleaning of the three main drains, and miscellaneous maintenance work were done. Shortage of labor seriously retarded the work. Sluicing operations were carried on intermittently throughout the month as irrigation requirements permitted.

*Construction; enlargements and betterments to Canal "A."*—Fair progress was made on the concrete lining, about 575 cubic yards of concrete being placed. At the close of the month all work contemplated for present construction had been completed except about 140 linear feet of reinforced lining near the head of the canal and the concreting of the extension of the rectangular open conduit at the outlet of Cold Springs reservoir. At the close of the month work was in progress on erecting forms and placing steel in the latter structure.

*Supplementary construction, east side.*—200 linear feet of 16-inch pipe and two small structures were constructed on supplementary construction, district No. 29.

*West side.*—Three small turnouts and measuring boxes were placed during the month.

*Visitors.*—F. E. Weymouth, chief engineer, visited the project on the 28th. Allen P. Joy, inspector for the Interior Department, was on the project April 27 and 28, and H. L. Holgate, district counsel, visited the project on the 2d and 3d to advise on legal matters.—*Maurice D. Scroggs.*

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

April was favorable for farming operations and for outdoor work generally. The total precipitation was 1.61 inches. This is more than double the average



precipitation for the month. However, the precipitation for the fractional year is only about 60 per cent of the average, based on a 10-year record.

Labor conditions remained the same. Men were difficult to obtain; wages varied from \$4.50 to \$5 per day.

Four small crews were engaged in canal cleaning and overhauling structures. Water was turned into the main canal and the Griffith Canal on the 21st. The head was raised gradually, with the idea of beginning deliveries May 1.

Drainage continued on the Ankeny lands with the 1 cubic yard Monighan Walking dragline. A broken gear and the necessity for placing a new drum prevented excavation for the last week of the month.

Farming operations were in active progress. The leased land on Tule Lake is being seeded, and on some of the land the grain is up.

On April 7 George R. Barnhart was assigned to the duties of timekeeper and general clerk, having been transferred from the Blackfeet project.

Allen P. Joy, inspector for the Secretary of the Interior, was on the project from the evening of the 21st to the morning of the 24th.—*Herbert D. Newell.*

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

April was unusually wet and cold, and although the precipitation amounted to only 3 inches, it was so distributed that it kept the roads and the fields thoroughly saturated and prevented almost all kinds of work. The unseasonably cold and wet weather prevented the growth of grass and little grain has been seeded. The wind movement during the month was moderate, the maximum velocity being 36 miles per hour.

The work of preparing substructure to the Indian Creek flume and increasing the grade to give greater capacity was completed; work of the same nature on Horse Creek flume was practically finished. At the Orman station two crews were busy on general structure work and building of small flumes; the Bransberg flume on the Johnson lateral was well under way at the end of the month, and the Barker flume in Indian Creek Flat was begun. In the Vale district a small maintenance force was busy whenever weather would permit on repairing structures and replacing decayed chutes. The work in this district has progressed somewhat more satisfactorily than on the rest of the project, owing to the sandy nature of the soil, better roads and the fact that labor is more easily obtained there than elsewhere on the project. The only work accomplished in the Newell district was in connection with the manufacture of concrete pipe for the replacement of the wood stave pipe on Townsite lateral. The continuance of wet weather has rendered the gumbo roads and laterals in such condition that it was impracticable to attempt any work. The manufacture of pipe has been considerably hindered also on account of the continued wet weather. The work is now progressing fairly satisfactorily and it is hoped may be accomplished before the necessity of delivering water through the canal arises. However, if it is found impossible to do so, it is now planned to carry the work as far as possible and then make connection with the old wood stave pipe with a view of completing in the fall.

Very little farm work had been accomplished up to the end of the month owing to the supersaturated condition of all fields, especially those of a clay nature.

In the sandier districts on the south side of the river 50 per cent of the grain area was sowed, but on the north side of the river practically none of this work was accomplished. It is now thought that most fields that were intended for wheat will be sown to oats or barley, provided the rainy weather lets up in time for these crops. Alfalfa fields were beginning to show signs of green and undoubtedly the first cutting will be two weeks or more later than usual this year.

Most live stock not regularly kept on the project has been moved to the range, although it is realized that stockmen are taking considerable chances in doing so, owing to the shortness of the grass and the likelihood of storm at this time of the year injuring stock which are in a weakened condition from lack of sufficient feed. The project has been out of hay for more than a month and nearly all stock has been fed during that time on prairie hay shipped in from eastern South Dakota and sold at from \$30 to \$40 a ton. The cost of such feed to the farmer can be realized when the cost of hauling, together with the price of the hay, is taken into consideration. The roads have been in such condition that four horses could scarcely pull a ton of hay, and many farmers had to haul from 5 to 8 miles to keep their stock from starving. This has been the most severe winter on stock within the history of the project, it is believed.

Labor conditions were more unsatisfactory for April than any month in the past two years. Serious thought was given to shipping in labor from Omaha or Denver, but the weather continued so bad that this expediency was abandoned. Late in the month some 20 Mexicans were turned loose by the sugar company of Belle Fourche and were used until the close of the month in connection with the manufacture of cement pipe and other repair work. A large majority drifted on at the end of the month. On the 21st practically all labor employed was put on a 9-hour day basis.

On the 11th of the month Assistant Chief Engineer C. P. Williams arrived in Newell. He remained on the project until the following Saturday evening. His time was given, while on the project, principally to the matter of the Chicken Creek Reservoir and a general understanding between the Service and the Redwater Canal Association looking toward the construction of this reservoir. District Counsel Henry A. Cox arrived in Newell on the 13th and left for Denver on the afternoon of the 15th. His time on the project was spent in connection with the proposed contract between the United States and the Redwater Canal Association in connection with the construction and use of the proposed Chicken Creek Reservoir. C. A. Lyman, in charge of repayment accounts, Washington office, arrived on the project on April 22, remaining until the 25th. While on the project Mr. Lyman put in most of his time in connection with water-right accounts and looking into the advisability of forcing lands subject to the law to take out water-right applications.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

April was generally stormy and cold. At the east portal of the Strawberry Tunnel the precipitation was 2.82 inches, with 23 inches of snow fall and a minimum temperature of 7° below zero on the 22d. At Provo the precipitation was 2.46 inches, with a minimum temperature of 20°.

**Farming operations.**—The unusual cold and stormy weather has retarded farming operations to some extent and work is now being done that should have been done three weeks ago. The winter wheat and alfalfa crops are doing well, but the planting of the sugar-beet crop has been delayed. There had been no demand for irrigation water up to the end of the month. The High Line Canal started to use water on the 29th with a flow of 40 second-feet for stock water. The spring run-off has begun and on the 1st of May the Spanish Fork River was discharging 450 second-feet.

**Labor conditions.**—Common labor and teams are scarce due to the demand for these classes by the large amount of road work that is being done in the county. Skilled labor is plentiful.

**Operation and maintenance, storage system.**—Work on the repairs to the Strawberry Tunnel progressed satisfactorily and at the end of the month all timbering had been completed and work begun on the floor. The usual maintenance work on Trail Hollow and Indian Creek feeder canals was done and the canals made ready to receive this year's run-off.

**Operation and maintenance, power system.**—The power plant was operated without interruption and power furnished to the towns of Payson, Salem, Spanish Fork, and Springville. Several new repair parts for the water wheels were received at the plant and as soon as the new runners and shafts arrive the contemplated repairs will be started.

**Settlement.**—Two farm units were filed on during the month under the High Line units and six new water-right applications received and accepted.

**General.**—Contract for the purchase of 2,000 acre-feet of water by the Springville irrigation district was approved by the director on the 26th. Negotiations were begun for the sale of 2,000 acre-feet of water to landowners under the proposed Santaquin pumping plant. The landowners under the proposed Juab County extension are raising \$1,500 to defray the expenses of a board of engineers to be called for the purpose of making final disposition as to the feasibility and cost of the proposed extension.

Project Manager J. L. Lytel was transferred to the Yakima project on the 17th to act as project manager, succeeding R. K. Tiffany, project manager, resigned.—*W. L. Whittemore.*

#### OKANOGAN PROJECT, WASHINGTON.

For the entire month of April mild weather prevailed; however, precipitation was far above the normal. This was the wettest April on record for this section and more snow has fallen in the watershed than has fallen in any month since December.

The shipment of apples was carried forward during the month and at the end of the month few remained for shipment. The warehouse is now busy making boxes, manufacturing box shooks, and getting ready for the next crop. Prices for apples remained at \$0.056 per pound, the price of hay dropped to \$20 per ton in the stack, and potatoes went up to about \$5.50 per bushel.

The routine office work was carried forward during the month and in addition to that a great deal of work has been necessary in connection with emergency purchasing and delivery of equipment, materials, and supplies, and a great deal of work has also been done in connection with the purchasing of sandy and water-right equities. The annual operation and

maintenance report and project history was completed and forwarded.

The work in the field consisted of staking out and building foundations and floor for the generating plant; pouring concrete for the cooling tower; placing the 200-horsepower engine on its foundation; moving the generator from power plant No. 2 to the emergency power station and setting it on the foundation; staking out right of way for the transmission line and delivering the poles on the ground for the line; and further digging on wells Nos. 1 and 2, the first of which has developed into a well delivering about 400 gallons per minute. Well No. 2 was only developed to water at the end of the month. The new foundation for the Duck Lake engine was completed and the engine was overhauled and moved on the foundation. Salmon Lake pumping plant was overhauled and repair parts were received for it. Early operation of this plant is expected at its present setting. The building of a small canal from the setting at the upper end of Salmon Lake was completed and lumber was delivered on the ground for certain portions of flume and drops. At the end of the month all emergency work was well under way that had so far been undertaken and early completion can be expected.—*Calvin Casteel.*

#### SALMON LAKE DAM.

Weather conditions during April were favorable for construction work, except that the slowness with which the frost left the ground prevented earthwork during the first half of the month.

A steam shovel was worked throughout the month, one shift per day, on the Salmon Lake road excavation, completing 2,246 linear feet of road where the quantity of rock excavation exceeded the earth excavation. The rock crew is now working three-quarters of a mile ahead of the shovel, having drilled and shot the large amount of solid rock found in that length of the road.

The feeder canal to Salmon Lake reservoir was trimmed, by hand, for lining with concrete and primed to settle the new banks. Only one small break occurred during the priming operations. Preparations for placing the concrete lining and headworks are now complete.

A new borrow pit for core material for the Salmon Lake dam was cleared and stripped; during the last few days of the month the placing of this core material on the dam embankment was in progress.

The pumping plant at the lower end of Salmon Lake was placed in condition for operation, except for a few repair parts.

The excavation of the canal from the upper pumping plant site around the lower end of the lake was completed. Contracts were executed for the material needed for the wooden flumes on this canal.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for April was cooler than normal, with severe frost on the 3d and 21st. Precipitation was very light. Some snow fell in the surrounding hills and mountains.

**Operation and maintenance.**—The irrigation season on the Sunnyside unit opened on April 1. At that time about 250 second-feet were being diverted from the river into the main canal. During the first week



all branch canals were primed, and deliveries made in general throughout the project. Little demand for water was had for the first 10 days, owing to cold weather and wind storms. The diversion was gradually increased until on the 23d it amounted to approximately 1,050 second-feet. Water service continued throughout the month, with few interruptions to repair breaks. Water service to lands under the several pumping plants was begun on the following dates: April 5, Outlook irrigation district; April 4, Snipes Mountain irrigation district; April 3, Grandview irrigation district; April 10, Prosser irrigation district.

A total of 22,817 acre-feet of water was delivered to water users under the Sunnyside unit for the irrigation of 90,000 acres. Maintenance consisted of removal of silt, and clearing of weeds from the canals, the accumulation of which was largely caused by wind storms; also repair and reconstruction of various structures throughout the distribution system.

*Tieton unit.*—The irrigation season opened on the 7th, with a diversion of 50 second-feet from the Tieton River and 10 second-feet from the South Fork of Cowiche Creek, the latter being discontinued on the 9th. Water for filling cisterns and for spraying was well distributed over the project by the 15th. Delivery for irrigation commenced on the 19th, with 75 second-feet flowing in the canal, which was increased to 314 second-feet by the close of the month to meet the increasing demand. Service to lands under lateral S was delayed because of failure of the concrete portion of the D-1 siphon in section 6-12-17. Steps are being taken to replace the concrete with continuous wood-stave pipe. Maintenance consisted of sub-lateral cleaning, repair and replacement of small structures; also calking and priming small wooden flumes and laying small sewer tile lines in replacement of open ditches.

*Investigation and surveys for new units.*—No field work was in progress. The landowners under the Roza unit completed their organization as an irrigation district; and negotiations were begun with the Yakima irrigation district (Moxee unit) for a contract providing for completion of plans and surveys by the Government.

*Cooperative investigations, Pasco project.*—Under cooperative agreement with the State of Washington investigations were under way to determine water duty on lands under cultivation in the vicinity of Pasco and Burbank, Wash., for use in considering the feasibility of the proposed Pasco (Five Mile Rapids) project. Work accomplished during April consisted of installation of measuring boxes on the land at Pasco and working over water records at Burbank, the work being in charge of W. L. Rowe, of this office.

*Storage unit.*—At Lake Keechelus S. G. Harlis, timber contractor, had about a dozen men employed felling and bucking timber. Preparations were begun by this office to install a camp at Meadow Creek for the purpose of continuing clearing of the reservoir area this season, and it is expected that this work will begin about May 10.

Bids were opened April 5 covering the sale of approximately 4,000,000 feet of logs at Rimrock, and contract awarded to the Northern Pacific Lumber Co., of Yakima. This company will be ready to start operation of a sawmill very shortly. Bids were opened on April 27 for the sale of approximately 12,000,000 feet of standing timber at Lake Cle Elum within the reservoir area.—J. L. Lytel.

#### SHOSHONE PROJECT, WYOMING.

April was a cold, disagreeable month, with much cloudiness and wind. The precipitation on the lowlands was small, but there has been a considerable increase in snow in the mountains of the Shoshone River headwaters. Due to the disagreeable weather farm work is two weeks late of the corresponding season last year. Most of the ground is ready for seed, but little grain and no beets have yet been seeded. Shallow grading was possible from the 5th on, but frost was still encountered in drainage excavation at the end of the month.

*Water supply.*—The surface of Shoshone Reservoir dropped 3.1 feet during the month, storage decreasing 14,194 acre-feet. Heavy snow in the watershed of the reservoir gives promise of a large spring run-off, but the weather has not been warm enough to melt snow and increase the river flow.

*Operation and maintenance.*—Heavy maintenance work was in progress all month, consisting mainly of ditch cleaning. Some minor structures were built and others replaced, and a rating station built at the head of Frannie Canal. Water was turned into the system on April 23, mainly to supply water for drainage construction, but water was also delivered to 15 water users for the irrigation of about 100 acres, the first delivery being April 27. The Monighan drag line renewed cleaning Frannie Canal on a two-shift basis on the 13th, covering 1½ miles during the month.

*Crops.*—Crops are all marketed. It is difficult to secure hay and oats for construction work. Six cars of wheat, five cars of hay, six cars of alfalfa meal, seven cars of potatoes, two cars of sheep, and two cars of stock hogs constituted the bulk shipments from the project.

*Labor.*—The labor supply, at a pay rate of \$4.75 per day, has been adequate.

*Drainage.*—A board of engineers, to consider drainage problems of the project, set from the 19th to the 24th. A program has been outlined, which meets with the approval of the board of water users. An enlarged program is contemplated and seems urgent to keep tillable a considerable portion of the area on the Garland division, north of Bitter Creek. Two machines—one drag line and one trencher—were at work on this area at the end of the month. On the Frannie division the Bucyrus drag line continued working two shifts all month on the Howell drain.

*Field and office engineering.*—Little field work was done out of the Powell office during the month. The work done consisted of surveys in connection with maintenance and drainage. On the Frannie division 1 party was in the field on construction work and some land classification work in the third unit of that division.

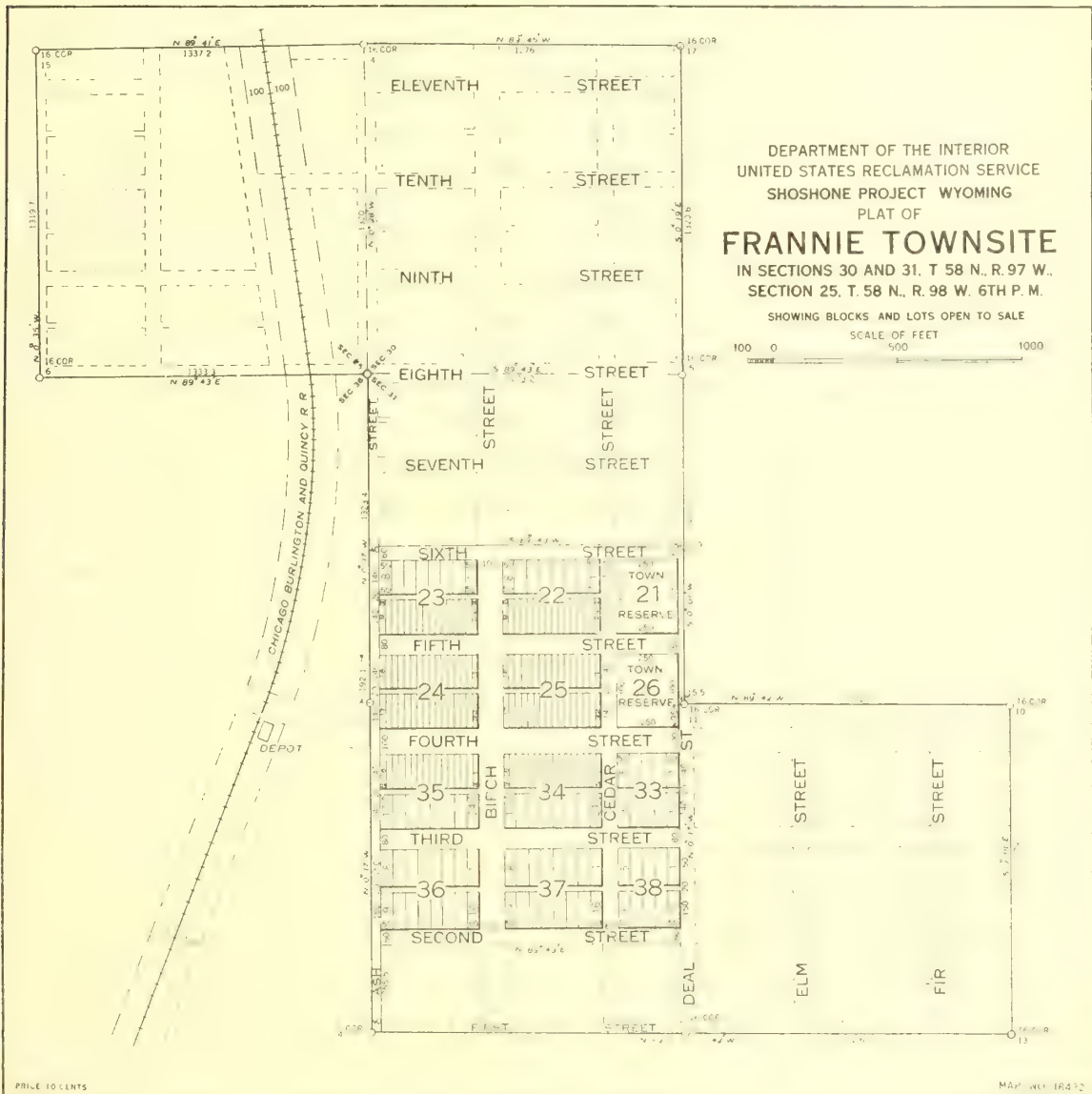
*Settlement.*—No new water-right applications were received during the month. Successful applicants of the seventh and eighth unit openings are generally establishing residence and beginning the cultivation of their places.

*Collections.*—Operation and maintenance collections continued fair. Of the accruals January 1, including the 1919 charges, 7 per cent was collected during the month, leaving 35 per cent outstanding.

*Water users' association.*—The board of directors of the water users' association met with the board of engineers on drainage on the 21st and discussed plans. A resolution was passed urging that drainage work be rushed to prevent further water-logging of lands.

**Construction.**—Construction by Government forces of second unit, Frannie division structures, was actively prosecuted during the month, and the work will be practically completed by May 20. Several ditch-rider camps were erected and work was also

done on the erection of a camp at Frannie for Government forces, construction on structures of the third unit. Contractors on the third unit, main canal excavation, returned to their work April 5-12 and will soon complete their work.—*J. S. Longwell.*



SALE OF LOTS IN FRANNIE TOWN SITE.

Town site approved by the Secretary of the Interior May 6, 1920. All lots shown in blocks 22 to 25 and in blocks 33 to 38, to be offered at public sale, at Frannie, Wyo., June 15, 1920. Terms of sale: The purchaser may at his option pay all cash or two-fifths in cash and the balance of purchase price in not to exceed three equal installments with interest at 6 per cent per annum.

All lots sold subsequent to public sale will be sold at United States land office at Lander, Wyo., at appraised value in cash at time of sale.



## INDIAN PROJECTS.

## BLACKFEET PROJECT, MONTANA.

April weather conditions were unsettled. Few days were free from storms and it was nearly impossible to do any construction or maintenance work.

A small crew was located on the upper end of the Two Medicine Canal and when weather conditions would permit worked on the placing and back filling of two concrete culverts to replace two timber flumes removed last fall. A small maintenance crew was located on the Two Medicine distributing system and at the end of the month preparations were made to start on the enlargement of the Two Medicine Canal with a drag-line excavator.

No canals were put in operation and the indications are that there will be no requirement for water for irrigation purposes during May.—*R. M. Snell.*

## FLATHEAD PROJECT, MONTANA.

April weather was favorable for construction work except the last week when considerable rainfall occurred. Spring farming operations have been retarded by the wet condition of the ground, but winter wheat and grasses are in excellent condition.

No trouble has been experienced in securing labor, but the quality is poor, necessitating frequent changes and replacements.

At McDonald Lake Dam the work was concentrated on the spillway. The 3-foot paving in the bottom of the pool was placed and concreted and half of the side paving was placed. The chute section was finished to neat lines and steel laid on one side slope. Steel was placed in the intake. All the steel for the spillway was cut and bent. One hundred and eighty-three linear feet of 8-inch and 10-inch drain tile and 145 linear feet of rock drain were laid under the spillway floor. A small crew was employed cutting wood to be used by the steam shovel on the excavation of the Pablo Feeder Canal.

The Pablo by-pass canal enlargement was completed on the 27th, and the gasoline dragline shut down.

Work on the Polson A lateral was completed and the force transferred to Pablo to complete the earthwork on the 27AA and 37A4 laterals and install the structures. A small crew was left on the Polson A lateral for priming and puddling.

Ashley Creek Camp was reopened on the 20th and work resumed on the Mission A lateral system. The work for the period consisted of lateral and minor structure excavation and excavation for the Ashley Creek wasteway.

Maintenance crews were organized at the various operation and maintenance camps and the usual spring cleaning of laterals and repair of structures carried on. No water deliveries, other than stock water in Jocko Division, were made during the month.

Slight gains in stored water were made, but up to the end of the month the stream run-off had not increased to any considerable extent.—*E. A. Moritz.*

## FORT PECK PROJECT, MONTANA.

The weather during April was very cold and rainy. There were only seven clear days during the month. Labor was very scarce and very few men were available for work.

Work was begun on the paving on the "F" dike of the Little Porcupine Reservoir and hauling gravel for the minor structures on Big Muddy unit. Two teams

were employed on the fore-apron for Big Porcupine Reservoir.

Water was delivered under the Big Porcupine unit only. No water was required under the Poplar River and Little Porcupine units.

On account of the late spring, little grass has started, and the range stock is in poor condition.

Assistant Chief Engineer Chas. P. Williams was on the project from April 29 to May 1.—*R. M. Conner.*

## RIVERTON PROJECT, WYOMING.

The temperature during April was several degrees colder than normal. There were several heavy snowstorms about the middle of the month. Early in the month the roads were in fair condition though rough, but the storms rendered them practically impassable throughout the latter part of the month.

Drag line No. 2 was operated two shifts from April 1 to 13, and drag line No. 1 was operated two shifts from April 14 to 30. The total amount of excavation moved during April was 14,368 cubic yards of class 1 material and heavy, coarse gravel. Work on construction of the camp at the diversion dam was discontinued about the middle of the month, as a camp sufficient for present needs had been completed.

F. G. Hough, examiner of accounts, visited the project from April 5 to 9.—*H. D. Comstock.*

## GENERAL OFFICES.

*Washington office.*—During April the director was in charge of the office, except for a few days, when he attended the quarterly meeting in Chicago of the American Society of Civil Engineers, of which he is president. On April 30 Mr. Davis left for Ottawa, Canada, to attend a hearing before the International Joint Commission on the question of the measurement and apportionment of the waters of Milk and St. Mary Rivers. While in Ottawa he was the guest of honor at a dinner given by the Ottawa branch of the Canadian Institute of Engineers. He returned to the office on May 7.

During the absence of the director from Washington the office was in charge of Morris Bien as acting director. On May 7 Mr. Bien left for St. Louis to attend the annual meeting of the American Association of Engineers as a delegate from the Washington chapter, planning to be away from the office about a week.

Judge King returned to the office on April 24 from his trip in connection with the Boise suit.

*Denver office.*—The chief engineer returned from the convention of the League of the Southwest held in Los Angeles on April 6. On the 19th he left for a trip to the field and up until the end of the month visited the Minidoka, King Hill, Boise, Umatilla, and Yakima projects. Assistant Chief Engineer R. F. Walter was in the Denver office the entire month. Mr. Charles P. Williams left on April 10 for a trip to the field and visited the Belle Fourche, Huntley, Lower Yellowstone, North Dakota pumping, and Fort Peck projects. Official visitors included Judge Will R. King and Messrs. A. J. Wiley, Andrew Weiss, John S. Longwell, F. G. Hough, J. R. Alexander, Henry Cox, E. W. Burr, and W. J. Egleston.—*R. F. Walter.*

There is one way to find out which cows are making the money. That is the use of milk scales, the Babcock test, and a cow-testing association.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

Hon. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSANG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamele, chief counsel; J. B. Beadle, secretary to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor; E. C. Bebb, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Loney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD OFFICES OF CHIEF COUNSEL.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Denver, Colo.**—Law section office of chief engineer; E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr and R. J. Coffey, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weintraub, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Balantine, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; C. C. Hogue, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. A. Keever, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melaas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Rothl, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, engineer and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; L. H. Kline, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, acting project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—P. J. Preston, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crowmover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppeilmann, chief clerk; E. M. Philbeaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

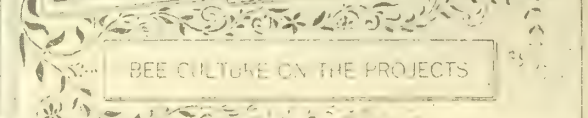
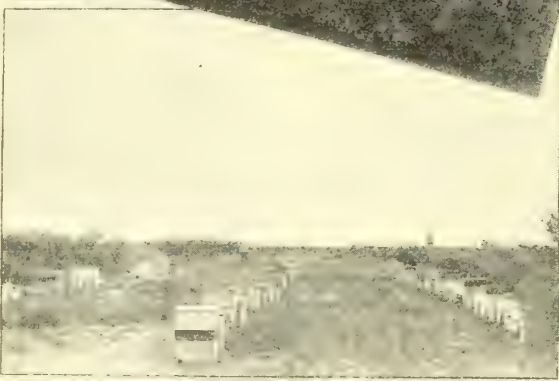
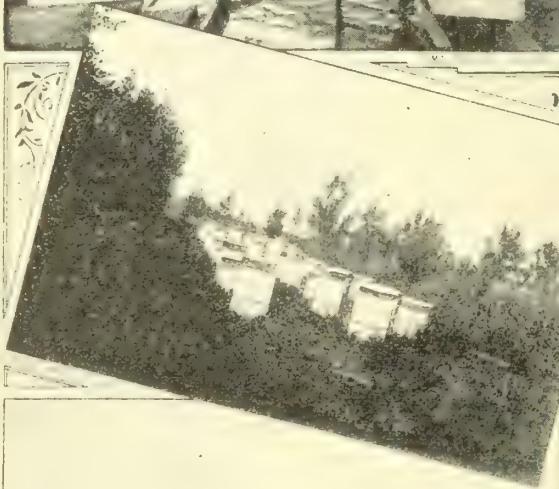
**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

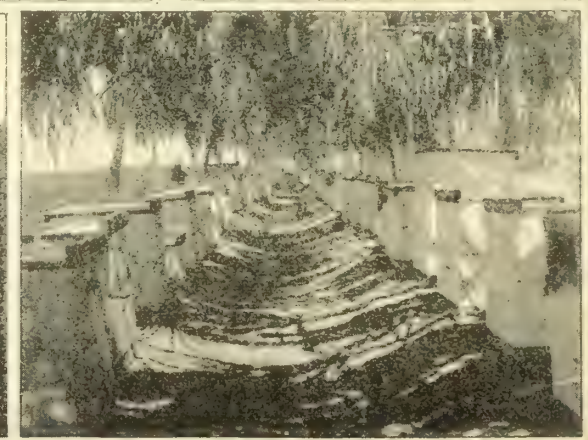
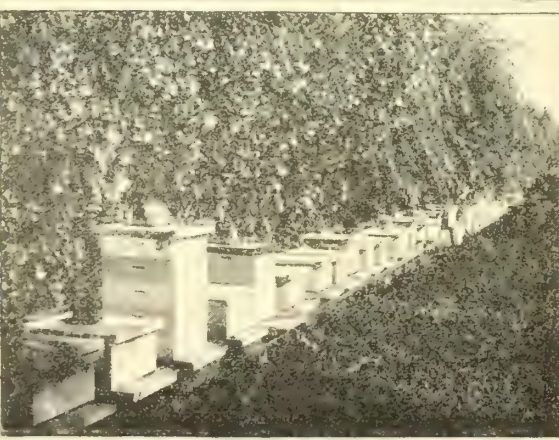
**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Balrd, chief clerk and fiscal agent.

WORK AND SAVE. BUY GOVERNMENT SECURITIES





BEE CULTURE ON THE PROJECTS





# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURER INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

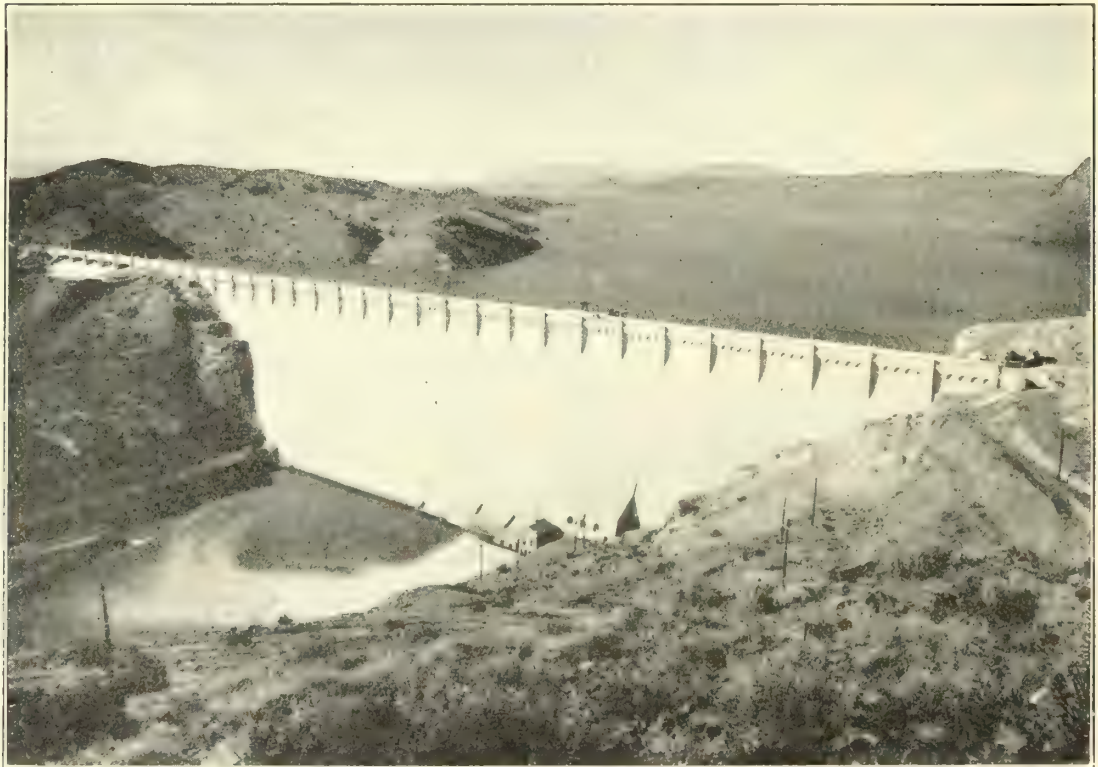
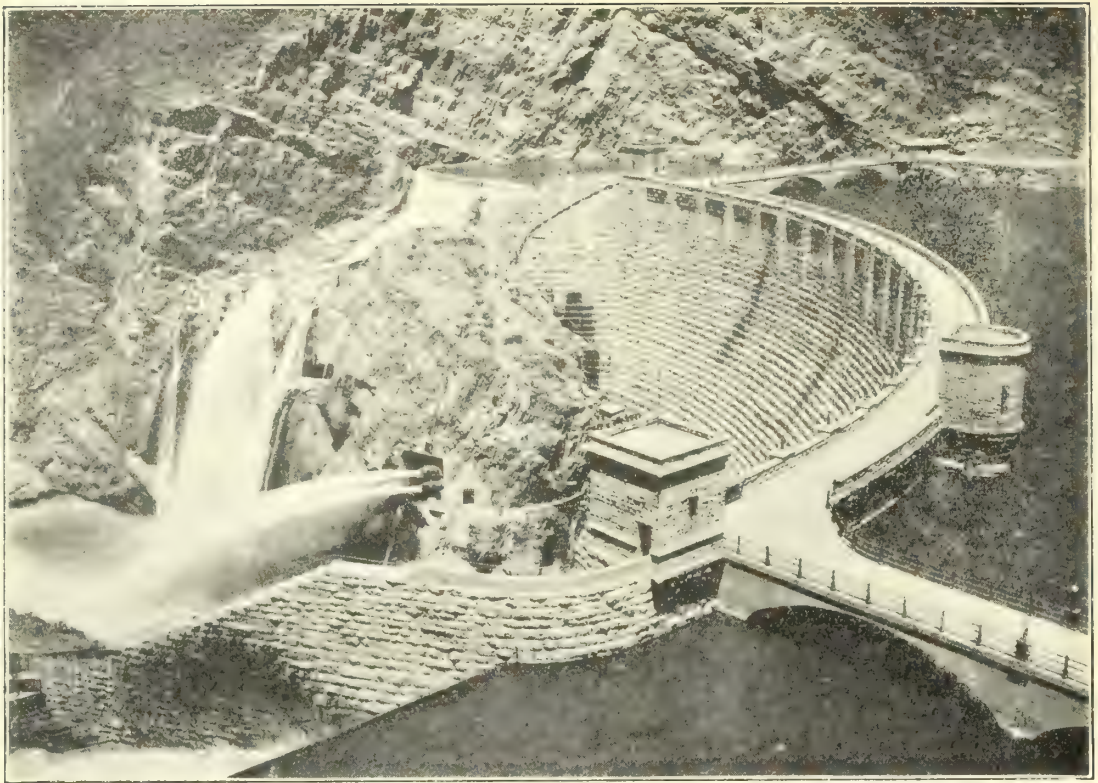
VOLUME 11, No. 7

PRICE (NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

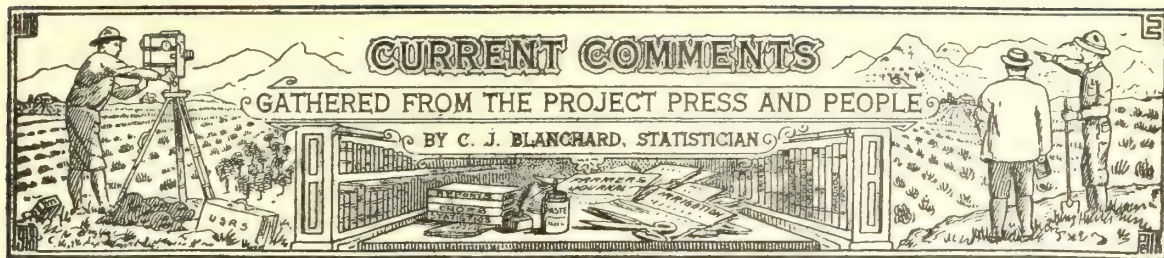
JULY, 1920







Upper: Roosevelt Dam, Salt River project, showing both spillways and two needle valves discharging excess water from reservoir, May 22, 1920.  
 Lower: Elephant Butte Dam, Rio Grande project, showing the reservoir, the largest artificial storage for irrigation in the world, May 31, 1920.



From the Minidoka project to Yuma the journey is long enough to impress the traveler with the vastness of our great western territory. In making the journey we cover many beautiful sections of Idaho and Utah green with springtime garb. We left the valley of the noble Snake, its mountains white with late spring snows, and entered the drainage of the great Salt Lake Basin. The lofty Wasatch Range was glistening beneath a sunny heaven, but the broad vistas of level valleys were vernal and fresh from abundant showers and ample irrigation. A season two weeks late, but giving promise of splendid crops, cheered the farmer and made the merchant smile. Salt Lake City, the metropolis of the Mormons, and the focal center of the financial, manufacturing, and commercial interests of the Great Interior Basin, reflects the prosperity of this marvelous region. Her big stores are crammed full of stocks, and her streets are alive with the bustle of business. The smoke of a thousand industries hangs heavily over it, and shuts out the beauty of her mountains. Unless means are found to remove the smoke pall, Salt Lake is destined to be known as the Pittsburgh of the West. From the City of the Saints to Riverside, the journey is across Nevada's desert, through a region of contrasts, but not without a beauty of its own.

Riverside, the beautiful, can not be described adequately in any language. It is the most restfully beautiful spot in America, and the few days we spent there will linger in our minds for years to come.

The hospitality of our genial host, Mr. Frank Miller, of Glenwood Mission, was extended to us in that unobtrusive way which has made this hostelry the most famous in the world. After the dusty trip over the desert wastes of Nevada, Riverside seemed more nearly like Paradise than any place we could imagine. In the care of H. A. Hammond, whose car was always at our disposal, we made a photographic survey of the valley and mountains. We filmed the drives and groves, the flowery paths and the artistic homes, and for a day the camera's eye sought and found the hidden charms of the Mission Inn.

When the problem of the Colorado is solved, Riverside will be one of the reclamation cities of the West. The tawny waters of this great stream will then be contributing to the material welfare of Riverside country, and a new Garden of Allah will rise from the desert on the eastern border. One day was devoted to a visit to Coachella Valley, the mysterious below-sea-level region of southern California, where under skies of brass the date palm flourishes. Here eastern capitalists are promotin an

industry taken from Arabia, and are promising this nation to supply us bountifully with the bread of the desert.

One night we spent at Palm Springs, and what a night! Nestling close to the snow-tipped San Jacinto lies a garden of transcendent beauty. Giant palms with gracefully spreading branches, immense oleanders all abloom white and red, innumerable roses of every color, countless clear cold streams, rollicking over the pebbles, and green lawns gave us pictures of peculiar beauty and charm, doubly enhanced by reason of the broad vista of forbidding desert stretching out endlessly to the east, north, and south. This desert oasis has no rival in our own land, and world travelers tell us it has no rival anywhere. Some day, when time permits, we want to return and linger here for a long period of quiet and rest.

Yuma, where a miracle has been performed, offered new surprises and many of them. In this connection there comes to mind a comment made by the writer in 1914 that on a morning ride from Yuma to Somerton not a farmer was found in the fields. There were miles and miles of mesquite, arrow weed, and cottonwood, and mighty few acres of cultivated land. On the day of our recent journey down the valley the transformation was startling. Gone forever are the mesquite and weeds. The hummocks of sand have been smoothed and careful cultivation has brought the whole valley into one big area of crops. Alfalfa, cotton, grain, and gardens are everywhere in evidence. From Inspiration Point on the mesa the view is inspiring.

The future of the valley is now assured. From a region so unattractive that it seemed hopeless agriculturally it has become a garden of such productivity that it now holds the record for the highest average acreage return among the projects.

What of the mesa? Ask the man from Yuma or the chap who with others has purchased nearly a million and a half dollars worth of it from the Government. Their optimism is unbounded, their faith unflinching. Our beloved mesa, where frosts never touch either the delicate blossom of the orange or its golden fruit, where sunshine is perpetual, and where silt-laden waters from the Colorado give incredible impetus to growth, why, it is the one best spot on earth. Three-year-old oranges and grape fruit producing a box to the tree, that's the story you hear, and they can show you the trees and you may eat of the fruit. Take the well-balanced roadway from Yuma out across the mesa to the young Hill orchard and see the remarkable growth of trees, note their brilliant and healthy



foliage, and forever quit doubting that here is to be the great citrus-growing section of our country.

Faith in its future estate is unrivaled in Yuma, now a modern western city growing by leaps and bounds and growing right. New schools, public and commercial buildings, fine homes, beautiful streets, and paved roads meet the eye on every hand. And the people, smiling, happy, vigorous, and ambitious, join in every forward step in development. It is good for you to be among them and breathe for a time this atmosphere of cheerfulness.

Salt River Valley, with its charm of mystery, its age-old tradition of irrigation, its mounds and cliff dwellings, has added to its attractions the latest touch of modernity in up-to-date homes, in towns and villages which are expanding into cities, in diversity of agriculture which places it in the forefront of the producing areas of the world. It is difficult for one who only visits this valley occasionally to visualize the remarkable change in the agricultural methods. In the early days of the project the large ranches were numerous and the live-stock industry was in the ascendant. As usual in such cases agricultural methods were loose and unscientific. Cultivation was subordinated to growing forage crops. To-day the growing of the best cotton in the world on nearly one-half of the entire irrigated area has compelled a complete change in farm methods. Clean and frequent cultivation has checked the growth of Johnson and Bermuda grass, weeds are eliminated, and a more careful preparation of the land has become common. The application of water is approaching an exact science. Wealth beyond the dreams of the farmers has been their reward. Land values have reached astounding figures, and these are not based largely upon the flowery statements of realtors. Producing the best variety of cotton on earth, with a demand far exceeding supply and constantly growing, the future of the industry seems permanent and profitable. Under these conditions farmers feel warranted in planning extensive improvements in their equipment and homes. The investment in new buildings, in motor-driven equipment, in modern conveniences such as electric appliances, is enormous. Farmers are meeting the labor shortage by power machinery, which results in many important economies. The tractor is replacing the mule and horse everywhere. In other branches agriculture is being organized and more wisely directed both from the producing and selling ends. Arizona's lettuce in train loads is reaching the tables of the eastern consumer, cantaloupes are rushed in iced cars to all markets, and in many other lines Arizona-grown products are taking their place in the best markets of the country.

The farmer has become a business man in the fullest sense. With his financial prosperity has grown a desire for better living. The autos which crowd the well-cared-for roads denote his appreciation of the need of recreation, and the whole family benefits thereby. The town has grown nearer the country, with a lot of its lure and glamour removed by reason of its readier access. Relations between the farmer and the business man are more intimate,

and both are benefited thereby. Old H. C. L. is not terrifying these people to any noticeable extent.

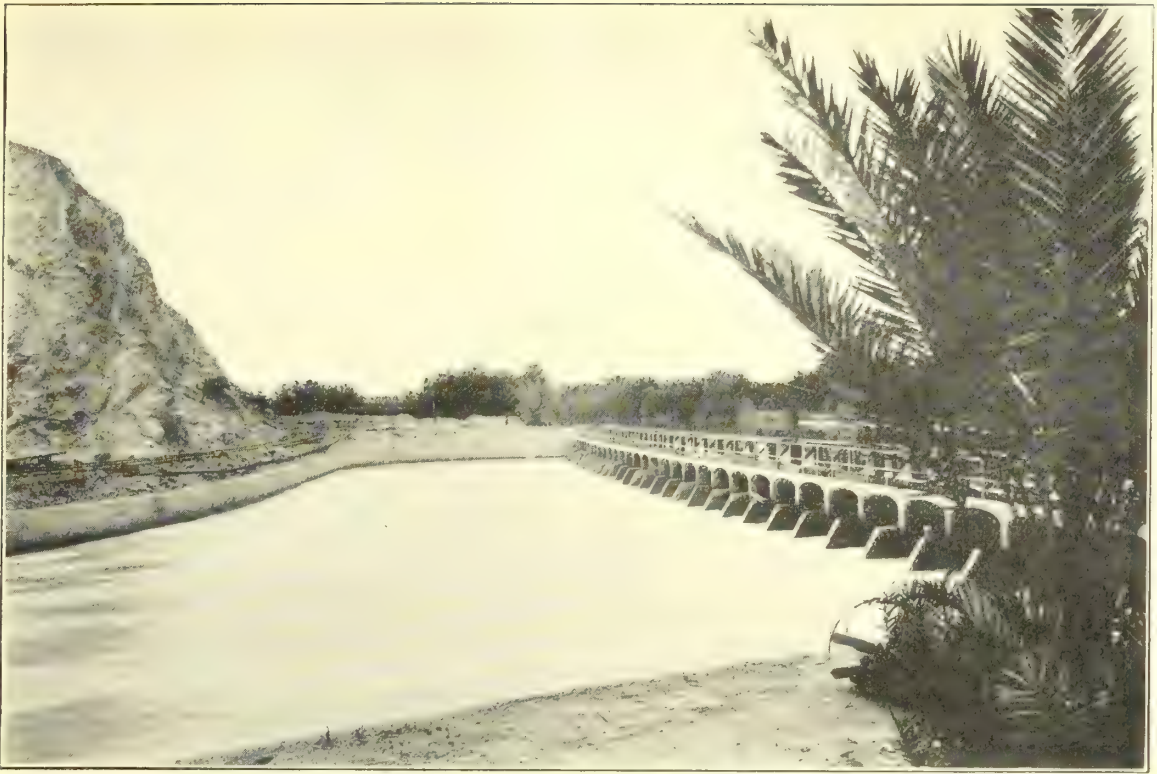
One morning we journeyed to Roosevelt Dam over the route we once made through the wilderness on horseback. Again we looked spellbound upon the great dam which blocks the somber chasm of Salt River. Over its wide spillways tumble the white waters dashing downward upon the rocks below. Two needle valves in the dam, each expelling a thousand cubic feet of water a second, added to the impressiveness of the scene. Roosevelt Reservoir, full to brimming, spread out before us for miles, its still bosom reflecting the fleecy clouds. Gazing upon the beautiful lake, we called up a vision of the splendid valley far below, to whose prosperity these waters are now linked, and the beneficence of national reclamation was clear to us. Here is water sufficient to cover a quarter of a million acres 4 feet deep in 1920, and this water will produce a \$25,000,000 crop. Can you sense the full importance of this fact? Not unless you have seen this valley as we did when a broken and dilapidated irrigation system had brought it face to face with ruin and its people to despair. It were worth while for a generous Nation to have wrought this miracle without making it a charge upon the valley, but the people never asked that. They wanted only the temporary aid of the Government in establishing a permanent water system, and this guaranty of a return of the cost is being made good.

It is, indeed, true that Salt River Valley is the place where big dreams become realities.

Rio Grande Valley, New Mexico-Texas. A few days in the valley of the Rio Grande is calculated to prove a sure remedy for the blues. As you journey over the miles and miles of concrete and graveled roads and view the hundreds of prosperous farmsteads, you slough off your grouch and attune yourself to the new note of prosperity which pervades everything down here. Yes; drainage is largely responsible for it. The big drain ditches have done the trick. Areas a short time ago better adapted for fish farming than agriculture have come back to cotton, alfalfa, and grain. The stagnant pools are gone and a new and vigorous spirit has returned to dispel the gloom of other days. A very decided change in agricultural methods is in evidence all over the valley. Cotton is the new factor which has made this change necessary. With its advent have come numerous shrewd men from the Imperial, Salt River, and Yuma Valleys, attracted by cheaper lands, rich soil, and favorable climate, and they have brought with them experience, skill, and knowledge of this industry.

The best cotton field in the valley is that of our friend Utting, a former Yuman, who has transformed an area of mesquite into as perfect a farm as one could wish to see.

The organizations of farmers in both valleys are now in good hands. The farmers are running things, and there is little friction. Promoting the production of special crops through organization of growers has been very successful. Such crops as cantaloupes, cabbages, and others have proven very profitable, and with the marketing under control of the grower all of the profits have not been gobbled up by middlemen. Excellent crops of alfalfa and grain are



Upper: View of intake of main canal at Laguna Dam, Yuma project, Lower: Arizona Canal, one of the main distributaries of the Salt River Valley irrigation system.



assured and the good stand of cotton is encouraging. The visitor in the valley can not refrain from passing compliments on the good roads. They are a joy to the autoist, and enable him to see so much with the minimum of time and expense.

In this fleeting mention of the valley we can not dwell as we should like upon the numerous individual evidences of progress. Las Cruces and El Paso have thriven mightily. Their growth has been in keeping with that of the great valley which feeds them. While the agricultural development here has been retarded by the rise of ground water and also by too much tenant farming, the condition to-day is markedly improved over that of two years ago. A big cotton crop this year is sure to bring a host of newcomers from the Southwest. Land values are rising, but they are yet far below those of other cotton-growing districts.

One unforgettable day was ours—the day we spent on a motor boat on the Elephant Butte Reservoir. Into this great basin created by the big dam the Rio Grande for months has been pouring its floods. But for the dam these floods would have created desolation and ruin from Socorro to Fabens. Losses running to millions would have attended the unchecked Rio Grande in its rush down the valley. No sign of such peril is visible below the dam; all is peaceful and serene. A shallow stream meanders gently down the valley well within its banks and, diverted at Percha, Leesburg, Mesilla, and the International Dams, is flowing through canals to make sure abundant crops. But above the limits of the storage reservoir the Rio Grande was a yellow monster with waves 3 feet high, and a current of 10 miles per hour was dashing against earth levees, tearing out railway tracks and bridges and inundating valleys and towns.

For weeks through service on the railway was abandoned. San Marcial was practically afloat, and hundreds of houses were completely surrounded with water. Pestilence stalks in the wake of the flood as cesspools and sewers are flooded and the streets are full of sewage.

Contrast this condition with that of the valley below the dam. Instead of fear of flood there is rejoicing that the great river is so generously cooperating in making farming sure.

The trip by motor boat is not to be ignored. We left in the early morning and, after a short voyage, reached the foot of Elephant Butte, now a picturesque island in an inland sea. A hot and trying climb up its steep and rocky side brought us to the summit, and we gazed upon a glorious picture of the dam and the canyon it closes. So high were we that the view encompassed the dam, the river winding in its rocky gorge below, and a wide vista of rolling plain and mountain beyond. Turning about and the great lake unfolded its beauties before us. For nearly 14 miles straightaway the broad expanse of water extended to the low line of hills which cut off the view. Fantastically carved buttes tinged with rose and blue rose from its waters, cone-shaped islands sprang up here and there, and the shore line on the left merged into a broad, level mesa running back clear to the lofty Sierra

Madre. Vagrant zephyrs broke up the reflections in the big pool and painted curved waving lines across its bosom. Above our heads soared an eagle whose nest was just below us in the old crater. When our pictures were taken we launched forth again upon the waters and plowed our way northward to old Fort McRae, associated in the early sixties with war and the days of the trader. How melancholy it looked. Its roofless adobe buildings stand gaunt and grim on the shore, the slow-rising waters eating into foundations. While we gazed the whole side of one big building fell outwards and dissolved before our eyes. By the time you read this the old fort is probably beneath the waters, a thing of history, but no longer of place.

Later we ran into an inlet and tied up at Old Paraje. Here was once a city of several thousand inhabitants, a place of much importance in the day of the Overland Trail. To-day it is a jumble of adobe ruins with a church still standing and two Mexican homes. It, too, is succumbing to the rising waters and will soon disappear.

In our day's boating we passed over half a dozen former villages now deep under water, and the sensation for a moment was depressing. But the thought came that these hamlets had given way in order that a new and better civilization should spring up in the broad valley below. It is comforting to remember this when you sail over one of these old towns, some of which had their origin before the American came here.

We wound our way for several miles through green lanes made of the tops of cottonwood trees which dotted the banks of the river. Boating through a forest was a novel experience to us. Next year this forest will be dead. Several of the trees were leafless, but in blooming white; others were resplendent in a garb of brilliant green and lifted their heads proudly in the face of death. On and on we sailed until the swift current checked our progress and advised us we were reaching the limit of the journey. In fact, we were rudely awakened by the grounding of our craft and the stopping of the engine. Two of our brave crew doffed their raiment, plunged into the stream, and pushed us off the bar. There are many beautiful spots along the shores of the reservoir, and the day is not far distant when summer camps will be numerous here. Fishing is excellent, the lake being well stocked with fish of many kinds. A day's journey in the biggest man-made lake in America is well worth your time.

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#### EX-PRESIDENT ON MINIDOKA PROJECT.

Former President William H. Taft visited the Minidoka project on June 4. He made a tour of the south side pumping unit, visiting the pumping stations. He expressed great interest in the signs of progress and prosperity that were evident on every side. Much of the construction work on the pumping unit was done during the Taft Administration. In the evening Mr. Taft talked to the people of Burley in the new Latter Day Saints Tabernacle, on the subject of Americanism *v.* Bolshevism.

## BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture,  
Washington, D. C.

## FARMERS' BULLETINS.

No. 449 (revised). *Rabies or hydrophobia*.—A communicable disease affecting all warm-blooded animals, including man. The dog is especially susceptible, and because of his roving habits is the chief disseminator of the disease. This bulletin gives full information concerning the nature, cause, transmission, diagnosis, prevention, and eradication of the disease.

No. 997 (reprint). *Terracing farm lands*.—Soil erosion, which annually results in enormous losses to the farmers of the United States, is most effectively prevented or controlled by terracing. This illustrated bulletin describes the bench terrace, the ridge terrace, terrace outlets, laying off terraces, building terraces, and the care and cultivation of terraces.

No. 1094. *The alfalfa caterpillar*.—This illustrated bulletin contains information relating to methods of controlling the pest by the management of irrigation water, as well as a brief account of its natural history, and is intended to meet the ever-increasing demands of ranchers and others for assistance in protecting their alfalfa against these "green worms."

No. 1088. *Selecting a farm*.—This illustrated bulletin is designed to aid the prospective buyer or renter in the choice of a farm. It is written for those who already have had some experience in farming, rather than for the uninitiated, and is intended primarily to afford suggestions to the farmer whose training has been rather limited or to the more experienced man who contemplates moving to an unfamiliar locality or changing to an unfamiliar type of farming.

No. 1097. *The stable fly*.—This bulletin contains the life history of this pest, with pertinent suggestions as to its natural and artificial control. Your live stock will appreciate your having a copy of this illustrated bulletin.

No. 1100. *Cooperative marketing of woodland products*.—This bulletin points out that what has been done in the cooperative marketing of other farm products can be done with woodland products also, with benefit both to the farmer and to the woodlands.

No. 1101. *The Argentine ant as a household pest*.—This bulletin contains a formula for a tree-banding mixture that will protect the trees of the nurseryman and orange grower. Various methods for isolating food in the house and a satisfactory ant poison to be used as a protection within doors and without are also described.

## DEPARTMENT CIRCULARS.

No. 86. *The work of the Huntley reclamation project experiment farm in 1918*.—This highly interesting and informative report deals with the results of the experimental work on the irrigated part of the farm, including crop rotations,

experiments with pasture grasses, pasturing experiments with hogs and dairy cattle, cropping methods, tests of crop varieties, experiments with sugar beets, and experiments with fruit trees and small fruits. Every Huntley project farmer should have a copy.

No. 96. *United States grades for potatoes*.—Standard grades for potatoes were recommended by the United States Department of Agriculture and the United States Food Administration on September 10, 1917. The specifications were determined by thorough investigations conducted by the Bureau of Markets.

No. 97. *United States grades for Bermuda onions*.—The Bureau of Markets recommends these grades as a standard for grading and marketing Bermuda onions in the United States. They are the result of investigations covering a period of four years.

No. 99. *United States grades for sweet potatoes*.—These grades are recommended by the Bureau of Markets as a standard for the grading and marketing of sweet potatoes. The department has no authority to promulgate standard grades for sweet potatoes, but it is believed that with the voluntary and general support of all interested parties these standards will assist in stabilizing the marketing of the crop.

## DEPARTMENT BULLETIN.

No. 821. *Frost protection in lemon orchards*.—An illustrated bulletin containing results of investigations in 1912 and 1913.

## Distributed by State Experiment Stations.

## \*UTAH BULLETINS, LOGAN, UTAH.

No. 172. *The value of barnyard manure on Utah soils*.—This illustrated bulletin reports results of experiments on the value of farm manure in increasing the yield of various crops on irrigated and dry-farm soils.

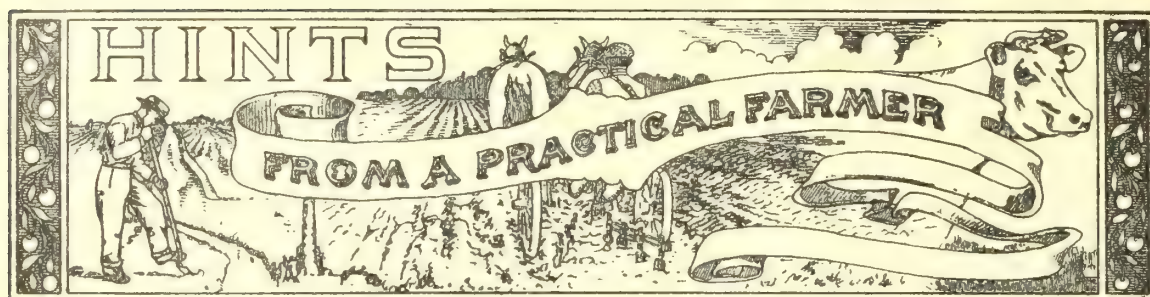
No. 173. *The duty of water in Cache Valley, Utah*.—This illustrated bulletin reports experiments on the duty of water in irrigating sugar beets, potatoes, alfalfa, corn, wheat, and oats raised on a deep medium soil in Cache Valley, Utah.

## DIRECTOR DAVIS RECEIVES NEW HONORS.

Arthur P. Davis, Director of the Reclamation Service, received the degree of Doctor of Engineering from Iowa State College on June 9, 1920. On the preceding day Mr. Davis gave an address to the engineering faculty and alumni at the Engineering Symposium, which was a feature of the semicentennial celebration of the college.

The value of the motor truck as an aid in marketing farm products is now well established. In bringing this about improved roads have been an essential factor.





### Poultry Lice.

Prof. F. R. Kenney, of the University of Arizona, gives the following practical treatment for poultry lice. He urges poultry owners to keep everlastingly after the lice.

Sodium fluoride gives very good results when used either in the dust form or as a dip. This may be purchased either as the commercial form or the chemically pure form. Since the commercial form is more easily applied by the dusting method and is the cheaper, it is the form to use. In purchasing this material be sure the druggist understands that you want "sodium fluoride" and not "sodium chloride" which is simply table salt. Sodium fluoride in the dry form keeps very well in covered bottles or cans.

Sodium fluoride mixed with about four times as much fine road dust, flour, or other such material may be shaken into the feathers with one hand while the other hand opens the feathers so as to allow the powder to reach all parts of the body. The sodium fluoride unmixed with the other material, may also be placed on by the "pinch method." This consists of taking small pinches of sodium fluoride and placing them among the feathers next to the skin. The material should be distributed all over the bird, on the head, neck, back, breast, tail, and thighs, and under the wings and vent. About 10 to 12 pinches should be used. For young chickens and turkeys, for sick birds and pigeons the above method is used rather than the "dipping" method.

In Arizona the dipping of fowls can be carried on with entire safety. Sodium fluoride does not stick up the feathers as do the oily dips formerly used and if the birds are dipped on a day which is not windy and they have at least an hour to dry it is the quickest and most economical method to use for large flocks. The lice are also killed much more quickly by the "dipping method" than by the "dusting method." Tepid water is used in which has been dissolved three-fourths of an ounce of sodium fluoride to each gallon of water. It is best to hold the fowls with the wing over the back with the left hand and dip the bird, leaving the head out of the solution. Ruffle the feathers with the right hand then duck the head once or twice. Lift the bird and allow it to drain for a few seconds and then release it. About half a minute is required to treat each bird.

### Calves Make Biggest Gain on Heavy Skim-milk Ration.

How much skim milk should be fed to calves daily?

Results obtained thus far at the Dairy Division experiment farm, Beltsville, Md., indicate that calves will make the greatest gains in weight when fed comparatively large quantities of skim milk daily (one-fifth of their body weight, or all they will drink), but that the most economical gains are made on smaller quantities.

In an experiment to determine the effect of feeding various quantities of skim milk, 16 calves were divided into groups of 4 calves each. These groups were balanced as nearly as possible with reference to breed and body weight at birth. One group was given a daily ration of one-seventh of the body weight, the quantity being regulated by body weights taken every 10 days. Two other groups were fed at the rate of one-sixth and one-fifth of their body weights; and the fourth group was given all the milk the calves would drink, twice a day.

Each calf received its mother's milk until it was 10 days old. The change to skim milk was then made gradually, and at the age of 15 days the calf was on an entire skim-milk ration. The experiment ran for 70 days. Weights obtained for three consecutive days, at the end of the 70-day period, were taken as the final weights. The average results from each group are given in tabular form:

Rate of feeding.	Daily gain.	Milk per day.	Milk per pound of gain.
	Pounds.	Pounds.	Pounds.
Group 1 (one-seventh of body weight) ..	0.95	13.52	14.4
Group 2 (one-sixth of body weight) .....	1.09	16.99	15.6
Group 3 (one-fifth of body weight) .....	1.26	20.96	17.0
Group 4 (all they would drink) .....	1.48	24.22	16.6

The groups were well balanced as regards weight and thrift of the calves.

The gains increased with the quantity of skim milk fed, the calves which received all they would drink making gains at least 50 per cent larger than those receiving milk at the rate of one-seventh of their body weight. To do this they drank about 80 per cent more milk. As a conse-

quence the skim milk required for 1 pound of gain was greater with the heavily fed calves.

No bad results from heavy feeding were noticed, although all of the calves in group 4, with one exception, drank, at times, more than 40 pounds of skim milk a day. This leads us to believe that overfeeding is not in itself a common cause of scours.

### Give the Hogs a Fish Course.

The common domestic pig will never be able to write a book on table manners, but he knows how to order a meal as well as anyone. He is in a fair way to demand a fish course to supplement his salad and vegetable diet. He will take his fish in the form of fish meal, the refined by-product made from sound, wholesome raw material at the sardine, tuna, and salmon canneries, or from the menhaden.

The fish meal is not to be confused with "fish scrap," a coarser by-product much used for fertililzer; the meal is made from clean, sound material and is intended to be used as food for cattle and hogs. Formerly the cannery waste was all made into "scrap" for fertilizer purposes, but the Bureau of Chemistry, United States Department of Agriculture, knowing the extremely high protein content of the scrap, has been active in converting this material into a high-grade protein feed. The cleaned, selected portion is ground to a fine, palatable meal which may be used to replace tankage in hog, poultry, or dairy rations.

Fish meal has been recommended as a supplementary ration before now, but popular prejudice against a badly prepared product has discouraged its use. The Department of Agriculture has proved by feeding experiments that fish meal equals the high-priced tankage as a ration ingredient, and better methods of selecting and milling have removed the causes of prejudice.

The oil content of the meal adds materially to its feeding value. So far the experiments have shown that the meal does not taint the animal product, whether it be pork, butter, eggs, or milk. Moreover, by diverting the fish meals to his animals instead of supplying it directly to his land as fertilizer, the farmer loses but a trifle of its fertilizing value and gains its entire feeding value, thus making the material yield two profits in the place of one.

### Poisoned Bran Saves Alfalfa.

A number of farmers near Tucson, in cooperation with County Agent C. B. Brown, have been very successful in combating a bad infestation of grasshoppers. The hoppers appeared in large numbers early in April on about 250 acres of alfalfa land, and were soon uniformly scattered over the entire area infested. In walking over the fields they could be seen hopping by the hundreds at every step one would take. A supply of white arsenic was ordered and an organized poisoning campaign put on to kill the grasshoppers before they reached the stage where they would migrate rapidly from newly mown fields. At present prac-

tically the entire infested area has been gone over once with the poisoned bait, and fully 75 per cent of the grasshoppers killed. With another application, as soon as the second crop of hay is out, there will not be enough of these pests left to cause any serious trouble next year. In most fields treated no dead hoppers were noticed until the third day.

The first lot of white arsenic used cost 25 cents per pound, but through the cooperation of D. A. Gilchrist, of the United States Biological Survey, this poison is now costing only 10 cents per pound.

The formula used for this bait is the poisoned bran mash which has been used successfully for a number of years: 25 pounds of bran, 1 pound of white arsenic, 6 lemons or oranges, 2 quarts of sirup, 2½ gallons of water.

The bran used was of rather poor quality, owing to the fact that it contained too much shorts and tended to become too sticky when wet. The tendency to ball up was largely overcome by rubbing between the hands before scattering. About 8 pounds per acre was as thin as the bait could be distributed. When white arsenic is used it is necessary to mix longer than when using Paris green, as it is less finely divided. The cost of application, not including labor, will range from 50 to 60 cents per acre.

The effectiveness of the bait can be best shown by a description of two adjacent fields of alfalfa which the county agent recently visited. The second crop on these two fields was comparable in every way so far as conditions governing growth were concerned, except that one had not been treated with the poisoned bait. The tallest alfalfa in the untreated field was not over 7 inches in height, with much of the ground almost bare of growth, while the crop in the treated field measured 17 inches and was uniform.

### What Is a Farm Bureau?

Stated briefly, a farm bureau is an organization for the mutual benefit of all who live from the land. A farm bureau promotes better agriculture, better homes, and better community life.

It is an organization combining the interests of all other agricultural organizations; a common ground where agricultural enterprises of the county as a whole may be determined upon.

### FRED D. PYLE RESIGNS.

Fred D. Pyle has resigned as project manager of the Uncompahgre project, Colorado, on account of the health of his wife. Mr. Pyle had been employed in the Reclamation Service in various engineering capacities since April 30, 1905, and was in charge of the Uncompahgre project for nearly seven years.

The cleaning and disinfection of railroad stock cars is an important means of preventing the spread of infectious diseases of live stock.



## WHEN TO USE SUNFLOWERS FOR SILAGE.

Prepared by the United States Department of Agriculture.

That sunflowers have value as a silage crop has been well demonstrated by experiments conducted by the United States Department of Agriculture and by other investigators. But experience also shows that there are certain considerations, such as their being less palatable to stock than corn, which may limit the use of sunflowers. That their use is desirable in regions where corn does not do well, seems to be well established. Whether sunflowers will compete successfully with corn where conditions are favorable for the latter has not yet been determined. In any event dwellers on irrigation projects will do well to look into this subject which has attracted considerable attention within the past two years, interest centering largely in the growing of Mammoth Black Russian sunflowers as a silage crop. Since it is a comparatively new crop, the available information on its merits as compared with other crops is somewhat limited.

The Montana Experiment Station was the first to recommend sunflowers as a silage crop. Since then several experiment stations have become interested in the subject, though as yet little has been published regarding it. The office of Western Irrigation Agriculture, of the United States Department of Agriculture, has been conducting experiments with the sunflower at several of its field stations in the Great Plains region, the most extensive work being done at the Huntley station in Montana.

### HIGH YIELD COMPARED WITH CORN.

The outstanding factor about sunflowers which has attracted attention is the high yield as compared with corn. In many sections where corn can not be produced profitably, due to climatic conditions, sunflowers have done exceptionally well. The Huntley station reports a single plat yield of 37 tons per acre, with an average yield from 10 plats of about 30 tons per acre, while under similar conditions corn yielded only about 10 tons per acre.

At the Scottsbluff station, in Nebraska, where the climate is somewhat more favorable to corn, the differences in yields were not nearly so pronounced. The average yield for sunflowers at Scottsbluff was 23 tons per acre, and for the best yielding variety of corn, 17 tons per acre. The results at the Newell station, in South Dakota, showed about the same relative yields, though much lower. At this place the yield of sunflowers for two years has been about 13 tons per acre, while the corn varieties best suited for silage have yielded about 9 tons per acre.

### FEED SUNFLOWER SILAGE FIRST.

With reference to their feeding value, the results obtained by the field stations of the office of Western Irrigation Agriculture indicate that sunflowers are less palatable and more constipating than corn. The results also indicate that where both sunflower silage and corn silage are

to be fed, the sunflower silage should be fed first. In a feeding experiment at the Huntley station where sunflower silage was alternated each month with corn silage in feeding two groups of dairy cows, the cows after eating corn silage, ate only small amounts of sunflower silage, thus causing them to drop off in their production. At the beginning of the experiment there was no appreciable difference in the amounts of silage consumed by each group. However, as soon as the change in feed was made the group changed from corn to sunflower silage consumed less and produced less, while the group that had its feed changed from sunflower to corn silage immediately consumed more silage and increased in their production.



The value of sunflowers as a silage crop has been well demonstrated. Yield, 30 tons per acre.

Farmers who have filled their silos with a mixture of corn and sunflowers, first putting in a layer of corn and then a layer of sunflowers, state that they have noticed no difference when feeding it out, either in the amounts consumed by the stock or in their milk production. It would appear from these statements that corn increases the palatability of the sunflowers, so in sections where the yield of corn per acre is low it might be advisable to make sunflowers the silage crop, growing a small acreage of corn only for mixing with the sunflowers.

The reports from farmers indicate another important point to bear in mind in the production of sunflower silage,

namely, that at present there is no adequate farm machinery on the market for harvesting sunflowers, and that under present conditions their harvesting is very objectionable

to farm labor. In fact, farmers state that it has been necessary for them to increase the wages of their laborers during the time they were harvesting sunflowers.

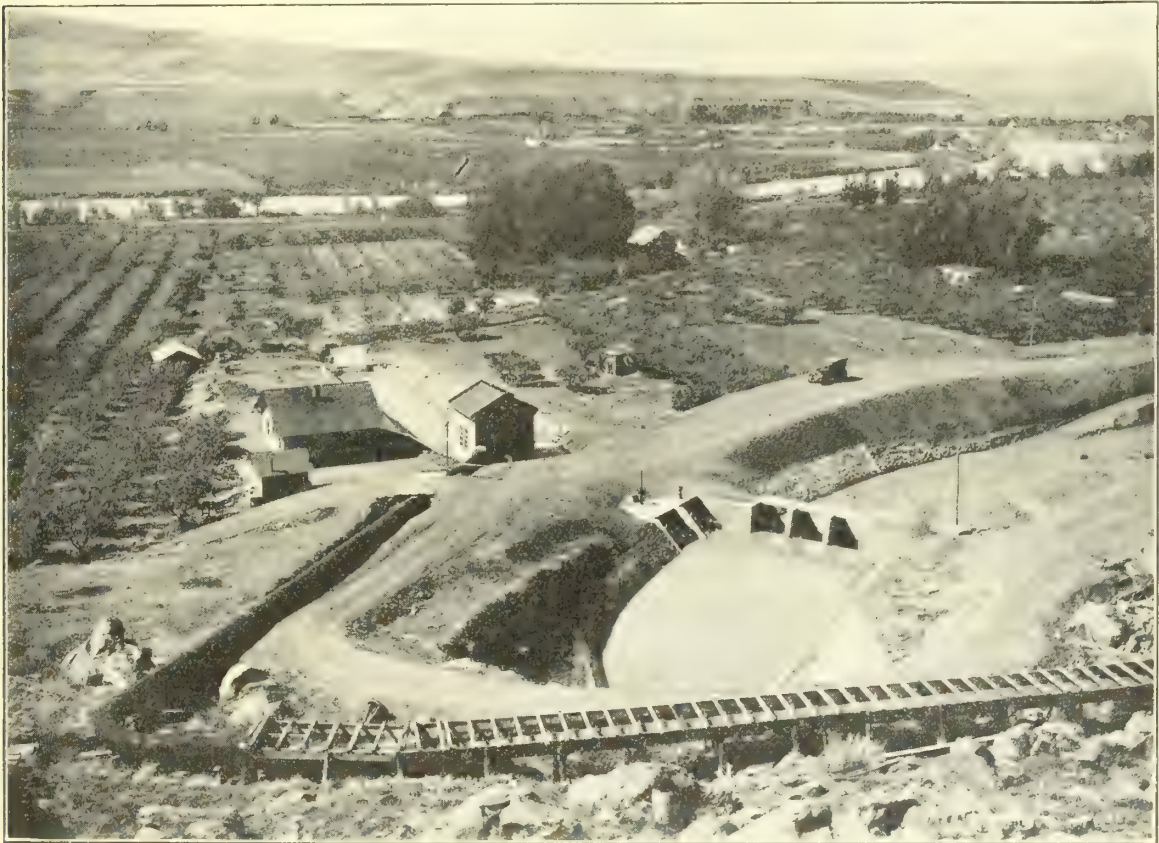
### THE PRICE-STUB PUMPING PLANT.

By S. O. Harper, Project Manager, Grand Valley Project.

One of the latest pumping installations made by the Reclamation Service is the Price-Stub pumping plant located on the Grand Valley project near Palisade, Colo. This plant was constructed early in 1919 for the purpose of supplying water to the Palisade and Mesa County Irrigation Districts.

The two districts include 8,400 acres of land lying in the east end of the Grand Valley between Grand Junction and Palisade. This land is undoubtedly the most highly developed and productive in the State of Colorado, and a large acreage is planted to peaches from which annual returns of

\$1,000 per acre are not uncommon. Previous to the season of 1919 their irrigation water supply was obtained by pumping from the Grand River with water-power pumping plants. The two districts owned and operated jointly a diversion dam and intake canal but each had its own power canal and pumping plant. These plants were among the pioneers in water-power development for irrigation pumping. The machinery was obsolete and the plants were inefficient, expensive to maintain, and extremely wasteful in their use of power water, their best efficiency being less than 30 per cent.



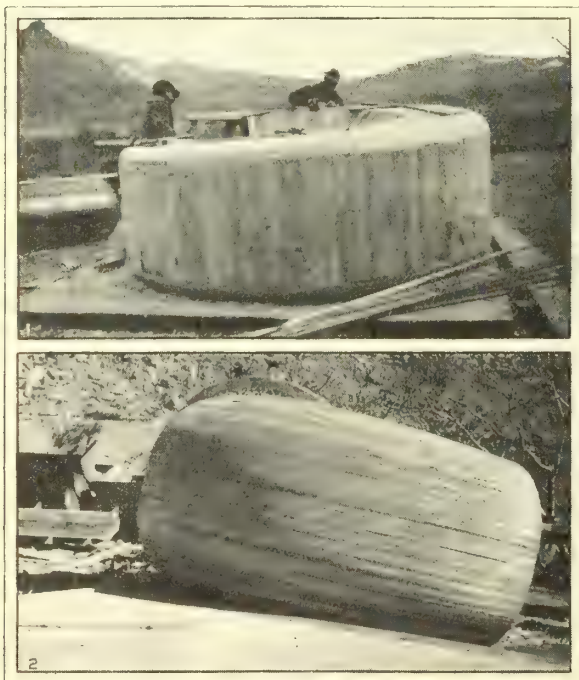
VIEW OF PRICE-STUB PUMPING PLANT.

Taken from a point over the outlet of Tunnel No. 3. Stub ditch flume, forebay, project main canal, pumping plant, and Price ditch in foreground. Palisade peach orchards, Grand River, and Orchard Mesa in distance.



The Mesa County district has a decree for 627 second-feet of power water for lifting 40 second-feet of irrigation water a height of 80 feet to the Stub Ditch, and the Palisade district has a decree for 573 second-feet of power water to pump 80 second-feet of irrigation water through a 30-foot lift into the Price ditch. The method used by the districts in pumping their water thus made it necessary to waste 1,200 second-feet of the flow of the river to irrigate only 8,400 acres of land.

Although the normal flow of the Grand River is ordinarily considerably in excess of all demands for irrigation, it was apparent in working out the plans for the Grand Valley project that in order to insure an adequate water supply in years of low flow the excessive waste of water in the operation of the pumping plants must be eliminated. The project main canal was therefore constructed of sufficient capacity to carry an additional 120 second-feet of water in anticipation of eventually supplying the districts through the project works. This canal, which diverts from the Grand River by gravity 5 miles up the river from the districts' pumping plants, is carried under the cliffs through a tunnel 7,300 feet long and emerges midway between the Price and Stub ditches. The relative location of the three canals at this point and the water requirements lent themselves readily to a plan whereby the water required by the Palisade district could be fed by gravity from the Government canal and the drop in the feeder line utilized to pump the water for the Mesa County district.



1. Form for turbine volute.  
2. Form for draft tube.

In 1918 the districts decided to abandon their old pumping plants and take advantage of the offer made by the Reclamation Service to supply them with water through the project works at a charge practically equivalent to the cost of operating the plants. Plans for the Price-Stub pumping plant were prepared in the Denver office, contracts for the machinery were awarded, and the construction work was completed during the winter of 1918-19 in time for the plant to be put in operation at the beginning of the 1919 irrigation season.

The Price-Stub plant is a good example of the most modern type of direct-connected hydraulic pumping machinery, and the installation is of special interest on account of the high efficiency obtained. The plant is located adjacent to the project main canal at the outlet of Tunnel No. 3. A check structure across the canal controlled by wooden flashboards is combined with the tunnel outlet to form the forebay. The penstock is of concrete 4½ feet square, and a by-pass conduit 3 feet in diameter is provided to permit delivery of water to the Price Ditch at times when the plant may be shut down for repairs. The discharge line consists of a 30-inch machine-banded wood-stave pipe 210 feet long. The building is of concrete construction with corrugated iron roof.

The pumping machinery (see drawing) consists of a 25½-inch vertical turbine direct connected to a 24-inch special centrifugal pump. The turbine was manufactured by the S. Morgan Smith Co., of York, Pa., and the pump was made by the Byron Jackson Iron Works, Berkeley, Calif. The net head on the turbine is 17 feet, and it is designed to develop 125 horsepower at 240 revolutions per minute with 77 second-feet of power water. The pump was guaranteed to deliver 25 second-feet of water against a head of 31 feet.

The turbine volute and the draft tube are cast in concrete, so designed as to pass the water through the turbine with a minimum friction loss. The forms for these parts were quite complicated, as the accompanying photographs will indicate, and their construction required considerable ingenuity on the part of the construction force.

The speed ring is of cast iron and is provided with an extension which forms the support for the pump. The top of the pump casing forms the support for a Gibbs oil-bath thrust bearing which carries the weight of the rotating parts of the turbine and pump. In addition to the main thrust bearing, three guide bearings are provided for the shaft. The oiling system consists of a supply tank, a filter tank, and two rotary pumps. The oil is fed from the supply tank by gravity and after passing through the bearings is pumped into the filter tank from which it is lifted to the supply tank and again fed to the bearings. The system is automatic in its operation, and a new supply of filtered oil is continuously fed to the bearings. With this arrangement of bearings, all moving parts are readily accessible.

During certain portions of the year the water of the Grand River contains a large quantity of silt, which is destructive to the submerged parts of turbines and pumps. This can-

dition was given special consideration in the design of the machinery for the Price-Stub plant, and provision was made for protecting the moving parts against wear and for renewing readily those parts which are exposed to excessive wear. A pressure settling tank is provided to supply clear water for the pump stuffing-box bearings. Removable steel wearing rings are provided for the running joints of turbine and pump, and all bearings are supplied with detachable bronze sleeves.

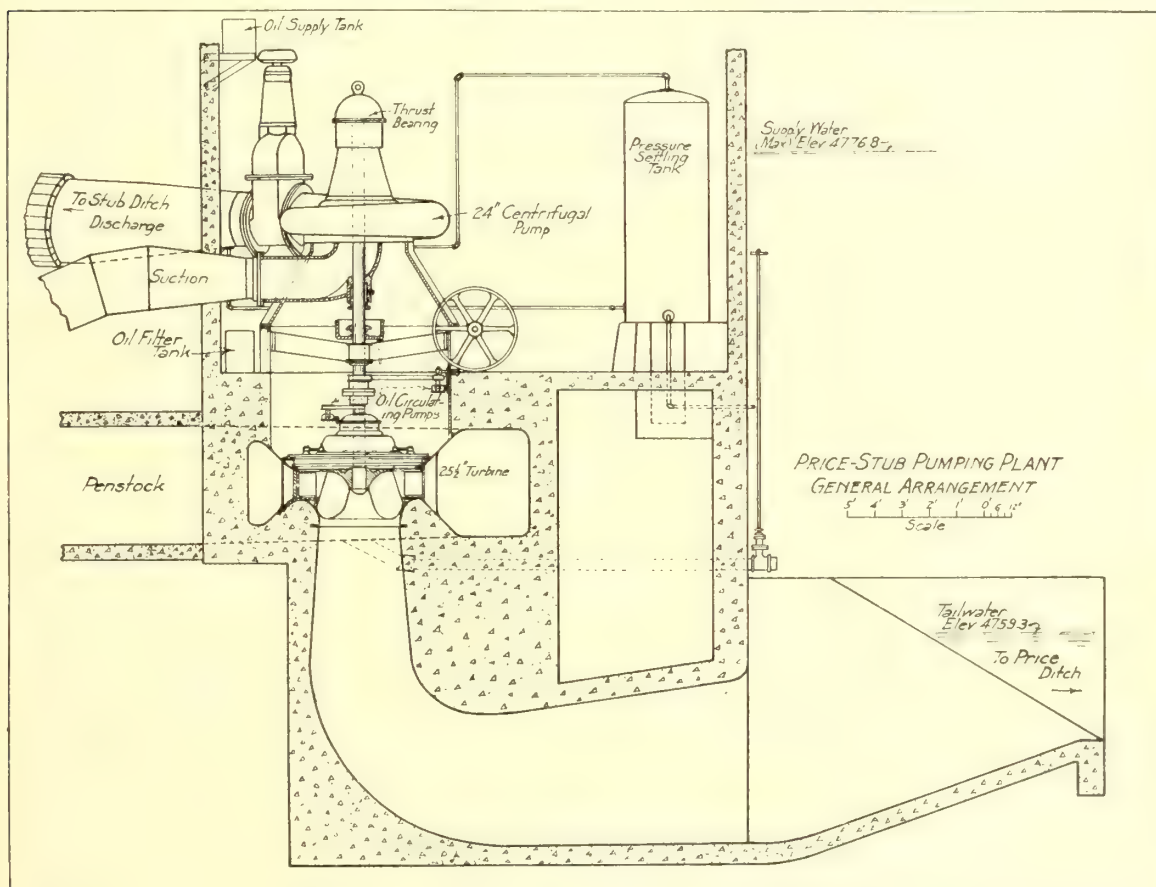
Inasmuch as the plant contains only one unit and interruption in its operation during the irrigation season would mean serious loss to the farmers dependent upon it, a supply of spare parts is kept on hand for emergency use. This supply includes all parts which might in any probability be required to safeguard against a shutdown during the season, such as turbine shaft and runner, pump shaft and impeller, wearing rings, bronze sleeves, and wearing parts for bearings. With this supply on hand any replacement which may be necessary can be made with only a short suspension of operation.

The construction of the plant was started in January, 1919, and completed far enough to permit it to be put in operation on April 10. The work was handled entirely by

Government forces. On account of the limited time available between irrigation seasons, the work had to be pushed as rapidly as possible. The excavation was handled with a drag-line excavator. Unfavorable weather added to the difficulties, and much of the concrete was placed with the temperature below freezing, making it necessary to take special precautions for its protection. The concrete was mixed in a small mixer set on top of the canal bank in such a position that practically all of it could be spouted directly into the forms. Sand and gravel were hauled a distance of  $1\frac{1}{2}$  miles through Tunnel No. 3 by motor truck.

The total cost of the plant and appurtenant structures was \$46,697.83, distributed as follows:

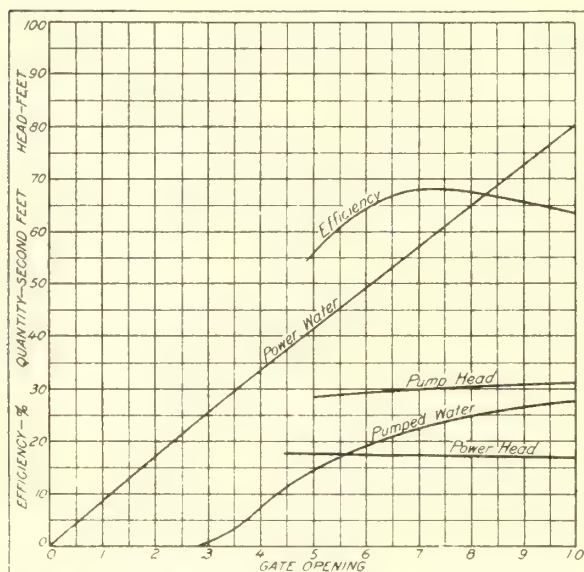
Check and forebay.....	\$10,888.16
Penstock.....	2,440.91
By-pass.....	1,135.81
Building.....	10,547.96
Hydraulic machinery and installation.....	18,412.22
Discharge pipe.....	1,195.96
Tailrace.....	2,076.81
Total.....	46,697.83



PUMPING MACHINERY, PRICE-STUB PUMPING PLANT.



The final test of the plant, which was made after it had been operated for two months, showed remarkably high efficiency for the entire range from 0.5 to full gate opening. The maximum combined efficiency of the unit was 68.3 per cent at 0.7 gate opening. Separate efficiencies as high as 88 per cent were indicated for the turbine and 82 per cent for the pump, but the combined efficiency was not so high as these figures would indicate because the points of maximum efficiency of the two units were not coincident. The results of the tests are shown graphically in the accompanying diagram.



Efficiency tests, Price-Stub Pumping Plant.

The information supplied by the diagram is of interest in indicating the output of a combined unit of this kind through the entire range of operation. Numerous data are available on the individual performance of both turbines

and centrifugal pumps, but the available information on the performance of a complete direct-connected unit is very limited. As the tail-water from the plant is used for irrigation, it is necessary at the beginning of the season when the irrigation requirements are small to supply an excess of water to the lower ditch before the centrifugal pump will attain sufficient speed to begin to throw water into the upper ditch. Unless there is ample water for this purpose and adequate wasteway facilities are available in the lower ditch, it might be necessary to install two pumping units in order to obtain sufficient flexibility. In the test of the Price-Stub plant the pump began to deliver water into the Stub ditch when the turbine was operated at 0.3 gate opening, and the irrigation requirements of the two ditches were such that it was necessary to feed surplus water to the lower ditch for a period of only 10 days at the beginning of the season.

The service during the season of 1919 has demonstrated that a plant of this type is not only highly efficient but is very dependable and economical in its operation and maintenance. During the seven months of the irrigation season no shutdowns were necessary except for a few short periods to remove sticks and trash from the pump. Only one man was required to handle the operation, and a house located adjacent to the pumping plant is provided for his use. An inspection of all bearings and other moving parts at the close of the year showed no appreciable wear and the machinery after the first season's operation was in excellent condition.

## IRRIGATION STATISTICS, FOURTEENTH CENSUS.

The Director of the Census announces, subject to correction, the following preliminary irrigation statistics. Similar statements for other counties will be issued as the figures become available, and will be published in the RECLAMATION RECORD from time to time.

### Irrigation by counties, 1920 and 1910.

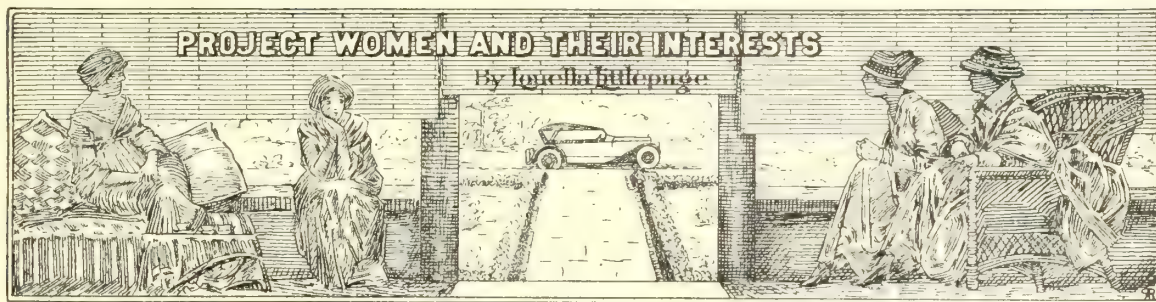
State and county.	Acreage to be irrigated by works either completed or under construction.			Acreage to which existing works are capable of supplying water.			Acreage irrigated.			Acreage available for settlement to be supplied with water by works either complete or under construction.	
	1920	1910	Increase (acres).	1920	1910	Increase (acres).	1919	1909	Increase (acres).	1920	1910
Minidoka County, Idaho <sup>1</sup> .....	72,000	.....	.....	72,000	.....	.....	59,260	.....	.....	500	.....
Custer County, Nebr. <sup>2</sup> .....	2,000	.....	.....	200	.....	.....	200	.....	.....	.....	.....
Pecos County, Tex.....	69,992	35,600	34,392	61,828	3,300	58,528	23,677	2,300	21,377	28,820	( <sup>3</sup> )
Ward County, Tex.....	71,500	105,012	4-33,512	37,000	28,712	8,288	20,000	16,406	3,594	49,600	( <sup>3</sup> )

<sup>1</sup> This county was created since 1910, and consequently no comparative figures can be given. The entire acreage is included in the Minidoka Irrigation District, which has taken over the operation of the gravity unit of the Minidoka project.

<sup>2</sup> Several small irrigation plans formerly used have been abandoned, and the acreage irrigated has decreased; not possible to show extent of decrease.

<sup>3</sup> Not reported in 1910.

<sup>4</sup> Decrease represents a shrinkage in exaggerated estimates rather than a check in development.



Human beings certainly do resemble sheep in the "follow your leader" characteristic. A few weeks ago a discouraged housekeeper remarked that she didn't expect to can this season because everything was so high, and immediately a ripple of "I can't afford to can" ran over the country, but the women who were fortunate enough to miss this parade realize that they can't afford not to can. Remember, the commission canners are paying a proportionate advance on the old cost, too, and factory canned fruits and vegetables will be higher next winter than ever before.

First of all, do not neglect nature's best tonic—green vegetables. There must be an abundance of certain foods through the winter to keep the human system in shape to resist disease. Green vegetables contain iron in abundance, and because it is in organic form it is far more available to the body than the iron found in mineral water or in medicine. Green vegetables also furnish other valuable minerals needed in the blood, bones, teeth, and body cells. Green vegetables form alkaline properties in the body which counteract the acids formed by meats, eggs, and cereals, and a noted food scientist says "The leafy green vegetables are protective in character in that they correct the faults in other foods which we are likely to consume." Some of the cultivated green vegetables are spinach, lettuce, beet tops, Swiss chard, rape, kale, Brussel sprouts, endive, and asparagus. Wild plants that may be used as green vegetables are dandelions (the highest of all in iron content), mustard, wild turnips, sour dock, pepper cress, and sorrel. So this most valuable food may be had for practically no money outlay.

To can greens: Prepare and can the day they are picked. Sort and wash thoroughly in several waters. Steam in steamer or colander 15 or 20 minutes, then plunge quickly into cold water. Cut in convenient lengths, pack tight in jar, and season if desired by adding a little chipped beef. Add hot water to fill crevices, and a level teaspoon of salt to each quart. If using glass jars place rubber and cap in position, partially seal, and sterilize by cooking 90 minutes in hot water bath outfit; 60 minutes in water seal; 50 minutes in steam-pressure outfit under 5 pounds of steam; 25 minutes in aluminum pressure cooker outfit at 15 pounds of steam. Lift cans from canner, tighten covers, and invert to test joints. Wrap in paper and store away.

Most people who can only for their families use such equipment as the farm home provides, such as a wash

boiler, galvanized vat, galvanized wash tub, or galvanized pail or other vessel with a well-fitting top. With a false bottom in these to protect the cans, and handles fitted in this for the purpose of lifting out the cans, these home-made outfits are very satisfactory and are classified as "Hot-water bath outfits." If you have been unable to get made a false bottom of slats or other material, a handful of hay may be put in the bottom to keep the cans from touching the bottom of the vessel.

It is a good plan to take a day to prepare your canning equipment, testing jars, etc. Rubbers should be new each year for the sake of economy, as a can or two of ruined food more than offsets the cost of new rubbers.

We have been told on good authority that 50 per cent of the products of garden and orchard are wasted every year because no effort is made to preserve them. If, by some miracle of modern education, this 50 per cent could be saved for winter use the problem of feeding the world at a reasonable cost would be half solved and the cost of food-stuffs would show a surprising decrease which, in turn, would tend to bring down the prices of all other commodities. So let us grumble less at high prices and do our share in bringing them down instead of waiting for some unknown force to force them down grade.

Never in the history of the country has canning been so profitable. To the woman who has a garden the cost of canning is practically nothing, as jars last for years, rubber bands are a small item, and a little labor plus a teaspoonful of salt will add a quart jar to the winter store. A few hours once a week through the season as the different vegetables come along, and the winter store is easily completed. When you can no longer get fresh vegetables from your own garden you will have to draw upon the reserve stocks of some one. Will it be your own, which cost you practically nothing but a little labor, or will it be that of the commercial canner, who is in the game for what he can get out of it and out of you?

Many vegetables, such as carrots and beets, can be stored away for winter. Do this, and be sure you have enough, but can a few jars of each while they are young and tender, so that you will have these delicacies in the early spring months when stored vegetables are wilted and tough.

Now about the lack of sugar for putting up fruits: Foreseeing just this difficulty the Government food experts have been experimenting for a couple of years or more and



speak from first-hand knowledge when they say that all fruits can be preserved for future use, particularly for jelly making, pie filling, salad purposes, and table fruit, without the use of sugar, by simply using boiling hot water instead of hot sirup for filling the jars or containers. In canning fruit without sugar, use only absolutely fresh, sound fruit. Prepare your fruit as usual, then pack in hot glass jars until full. Use a tablespoon, wooden ladle, or table knife for packing in jar. Pour boiling hot water over product until completely covered. Place rubbers and caps on jars—not tight—to allow steam to escape. Place jars in wash boiler or other sterilizer and boil or sterilize for the length of time given below, according to the particular type of outfit used:

Hot water bath, wash boiler, kettle, or other container, 30 minutes.

Water seal 214°, 20 minutes.

5-pound steam pressure, 12 minutes.

10-pound steam pressure, 10 minutes.

After boiling remove jars, screw caps down tight, allow to cool away from draft, wrap jars in paper, and store in cool, dry place. Stand glass jars upside down.

The utmost care should be used in sterilizing glass jars, caps, and rubbers. Wash jars and caps in cold water, then place in vessel, jars lying on side, and cover with cold water. Bring water slowly to the boiling point and boil 15 minutes. Sterilize the rubber rings by immersing in boiling hot water one minute—no longer. This process eliminates danger from ptomaine and other poisons.

#### NOT SO EXPENSIVE AFTER ALL.

But there is really no good reason for not canning fruits with sugar for table use. There are few desserts that do not take from one-half to 1 cup of sugar, and no dessert is more healthful than fruit. It is not necessary to use such thick sirup as was used in the days of plenty. A 10 per cent sirup made of 1 part sugar to 9 parts water will make palatable any of the acid fruits. Such fruits as apples, pineapples, and the like, can be canned without sugar. Ordinary glucose or corn sirup may be substituted for sugar in making the sirup. A palatable sirup is made by mixing one-half cup sugar, 1 cup glucose, and 8 cups of water.

It requires about 7 ounces of sugar for a pint jar. One cup of sugar will make 10 cups of sirup. A pound of sugar will make 20 cups. This last amount will be sufficient for 20 pints of canned fruit. Where the 10 per cent sirup is used the cost of the sugar to can a pint jar is 1½ cents with sugar at 30 cents a pound. So you see it is not so expensive after all.

There is a little knack worth knowing about combining the sugar and water for the sirup. If the sugar is sifted into the boiling water, just as fine-grained cereals are sifted into water, no scum will form. This saves sugar.

If you have never tried the modern method of canning, known as the cold-pack method, and do not understand the terms, write to the Department of Agriculture, Washington, D. C., and ask for complete directions. It is

probable you can get them nearer home by applying to your State agricultural college, your county agent, or some girls' canning club.

Save every drop of fruit juice that comes your way. Whenever a can of fruit is opened there is usually some extra juice. Put it in a closed jar in the ice box or spring, or wherever you keep your butter. Fruit juices make delicious drinks for hot summer days, but it must be used up within a few days, particularly if you do not have ice.

Try this: Half a cup of pineapple juice added to iced tea, with a few sprigs of mint, produces a delicious, refreshing drink.

Or add a little berry juice to lemonade, or flavor and color your pudding sauce with a little fruit juice.

The women of Redlands, Mesa County, Colo., have perfected a unique organization which is not only a canning club but a marketing association as well. They intend not only to take care of their own winter supply of vegetables and fruit, but to see that all surplus in their gardens is canned and marketed. Much of their canning will be done in tin.

#### To Set Colors.

Very few manufacturers guarantee their dyes these days, and it is safer to set the colors before making up goods than to trust to luck. If you object to wetting the new goods, then at least the garments should be subjected to some process to set the color before washing. And it is really very little trouble. Use the following proportions:

To 3 gallons of boiling water use 1 cup of vinegar for yellow, tan, brown, green, and lavender.

To 3 gallons boiling water use 1 cup of salt for blue, red, pink, and black.

To 1 gallon water 1 tablespoon sugar of lead for anything except pinks and blues.

Place folded goods in the solution and let stand over night. Remove goods, still folded, and when nearly dry iron with hot iron. Do not rub, just press, and your material will not be out of shape. If you wish the goods to retain that natural crispness, add 1 tablespoon of powdered alum.

#### A Better Community.

The Grand Junction Woman's Club, Grand Valley project, Colorado, at a recent meeting, held an informal symposium concerning things which would make for a better community. Suggestions for practical improvements ranged all the way from bicycle paths and good roads to increased interest in music and art. All of the speakers plead for an increased spirit of cooperation, which should bring women as close together as they were during the days of war work.

"Better community" meetings have been reported from a number of clubs on the Government projects, and such meetings are an assurance that there will be "better communities" wherever the women foregather for this purpose.

### Community House in Honor of Heroes.

The citizens of Olathe, and the surrounding farming section, Uncompahgre project, Colorado, are raising \$75,000 for the construction of a modern community house in honor of the soldiers, sailors, and marines who served in the World War. At a recent mass meeting it was the unanimous opinion of the large crowd present that Olathe needs a community house. The idea is to buy half a block one square from the business section, and erect a building with an auditorium large enough to seat 1,500 people, a gymnasium, a library and reading room, an armory for Company M of the State troops, and a hall for the local post of the American Legion. The State will donate \$25,000 for the armory, 25 Olathe citizens will give \$1,000 each, and the balance will be made up of small subscriptions.

### Orland Women Take the Lead.

The Woman's Improvement Club of Orland, Orland project, California, recently showed in pageant "The Spanish beginnings of California," and hundreds of spectators from town and the country round about attended and enjoyed the spectacle. It was reciprocity day with the ladies, and the clubs from all the towns in that part of the valley were invited and responded liberally. They were entertained at a 1 o'clock luncheon, after which they repaired to Greenwoods Grove for the pageant. The spectacle was written, managed, and staged by members of the Orland Club. The theme is romantic and lent itself to many pretty scenes, and to the use of customs and the representation of customs that brought back the most picturesque era of California's history. The affair was one of the most elaborate and successful ever held in that section.

Owing to the success of the pageant, the women of the club have been designated to some very important work in furnishing comfort and pleasure at the fair next fall. The women have bargained for the checking concession, and visitors to the fair will be able to check their parcels and wraps and be free to enjoy the show unhampered.

Also, the women have the watermelon concession, and the trade in this popular fruit is expected to be one of the big things at the fair. Melons will be sold by the slice, served on ice, and accompanied by smiles worth the price of admission.

Hot scones will also be sold, and this concession is expected to provide occupation and amusement for certain members. Some of the club women are adepts at baking scones in a manner that calls for indefinite numbers of repeat orders, and this booth no doubt will be very popular.

Last, but not least, the club women will have charge of the children's playground. This is a new department, and will be hailed with joy by all parents who wish to bring their children to the fair but who would like to be free to look around without their care, knowing the little tots

are being well cared for and are happy and safe. The playground will provided a place where the children can enjoy naps. Their play will be supervised and healthful.

The activities of the club members will result in added attractions for the fair and at the same time will prove profitable to the club.

### A Reclamation Cook Book.

It has been suggested that we start a RECLAMATION RECORD cook book to contain the favorite recipes of the women on the Government projects.

#### DIRECTIONS.

Send in at once your favorite recipe to the Woman's Section of the RECLAMATION RECORD, room 6034, New Interior Building, Washington, D. C.

Cut out and file the recipes published each month.

Plan how you can best preserve these recipes, and if you have any original ideas on the subject send them in.

Three plans have so far been suggested. The first is to make a regular old-fashioned scrap book. A regular scrap book may be purchased for the purpose, or every other leaf may be cut from some book which you do not care to keep and the remaining leaves used to paste the clippings on.

The second plan is to make a loose-leaf scrap book. Buy a good quality of typewriting paper, business letter size, make two covers of some heavy cardboard cut a trifle larger than the paper. Punch about four holes along one side a quarter of an inch from the edge and corresponding holes in the covers, through which to pass tapes, and tie the sheets of paper and covers together loosely, so that the book will open easily.

The third suggestion is to buy a small wood card-index box and blank cards to fit on which may be pasted or written the recipes you desire to keep. Guide cards to divide the recipes according to classification are time-savers. This outfit will cost less than a dollar, and is the most convenient and businesslike way of filing recipes yet discovered.

A few months ago two brides departed from this office, and each member of the Reclamation Service force wrote and autographed his favorite recipe on cards as souvenirs. A few of these are published below. Cut these out. One trial of any of these formulas will secure your enthusiastic cooperation in the Record Cook Book I am sure.

#### MUFFINS.

(A. P. Davis, Director.)

1 pound of flour.	$\frac{3}{4}$ cake yeast.
2 eggs.	$1\frac{1}{2}$ pints milk.
2 ounces butter and small piece of lard.	

Beat very light; set to rise in pan in which batter is made. After standing over night, put in muffin tins and let rise 1 hour. Bake  $\frac{1}{2}$  hour in quick oven.

This recipe makes 2 dozen muffins.



## NUT BREAD.

(C. E. Harris, Chief of Transportation Section.)

3 cups flour.  
3 teaspoonfuls baking powder.  
1 egg.  
1 cup of milk.

1 cup of nut meats (pecan or English walnuts or hickory nuts).  
Pinch salt.

Stir or sift baking powder in flour; mix all other ingredients separately, then add flour and baking powder. Make into a loaf; let stand in the pan about 15 minutes, and bake in slow oven 45 to 50 minutes.

## SLUM.

(F. L. Cavis, former Chief Accountant.)

Cut 2 pounds of lean, fresh beef into pieces about 1 by 3 inches. Heat a tablespoonful of drippings in a frying pan; drop in a few pieces of meat at a time, and sear and brown quickly. As soon as colored take them out until all are cooked. Add a tablespoonful of fat to that which remains in the pan and let it brown. Stir in 2 tablespoonfuls of flour, and when well browned add a quart of water and stir until thickened. (If desired a cupful of tomatoes, either fresh or canned, may replace that much water.) Season with salt and pepper and add 1 tablespoonful of finely chopped onion, 1 clove, and the meat. Cover and simmer 1 hour; add one-half cupful each of finely chopped carrot and turnip and cook until the meat is tender, which will take another hour. For dumplings make baking powder biscuit, place close together in shallow buttered pan and steam 15 minutes. Dish on large platter and arrange dumplings around it.

This is not only a delicious dish, but possesses the added attractions of being a splendid one-dish meal, adapted for wash or ironing day when there is a continuous fire, and also it may be made from the cheaper cuts of meat.

## POTATO SALAD.

(C. J. Blanchard, Statistician.)

2 quarts diced boiled potatoes.  
1 large Spanish or Bermuda onion, minced.

1 cup celery, cut fine.  
1 cup broken walnut meats.

Mix these ingredients, season, and mix with French dressing, then set in ice chest to chill.

*Dressing.*—Cream 1 heaping tablespoonful flour with large tablespoonful butter, 1 teaspoon salt, 2 of sugar, and 1 of mustard. Make very smooth, then add 2 whole eggs well beaten, 3 tablespoonfuls mild vinegar, and 1½ cups water. Put on fire in double boiler and stir until well thickened. When dressing is cold add half a cup of olive oil and half a cup of cream. If desired cream can be used alone, using a full cup.

Chopped green sweet peppers, mushrooms, thin slices of cucumbers, each or all will add greatly to salad. Chill the cooked dressing and mix with salad just before serving.

## DEVIL'S FOOD CAKE.

(Dr. H. A. Brown, Editor.)

*Custard.*—½ cake chocolate.  
1 cup brown sugar.  
1 egg yolk.  
½ cup milk.  
1 teaspoonful vanilla.

*Cake.*—1 cup brown sugar.  
1 cup butter.  
2 egg yolks.  
½ cup milk.  
2 cups flour.  
1 teaspoonful soda.

Dissolve soda in 2 tablespoonfuls boiling water; cream butter and sugar; add beaten egg yolks, and alternately milk and flour; beat in the custard which has been boiled in double boiler until thick; fold in beaten whites of eggs and add soda.

Make cake in three layers, using a boiled white icing between layers.

## The Way To Cook 'Em.

A project woman too modest to give her name suggests that some of the women who read the RECORD would be sure to like her method of cooking potatoes.

When you bake potatoes, pour boiling water over them, cover closely for 15 or 20 minutes, drain off the water, and put immediately into the hot oven. This is a better way than the often recommended plan of boiling them for 20 minutes before putting in the oven, because the boiling process cooks the outside of the potato, and when the baking is started the oven furnishes the mellowing process, and if care is not taken each potato will have a "bone" in it in the shape of a hard core. Merely letting the potatoes stand in the hot water heats them through, which is really the point to be achieved.

When you "French fry" potatoes, soak them first in cold water, drain, pour hot water over them, and let stand for two or three minutes. Dry them in a clean cloth, and drop in the fat in a wire basket so that all may be removed at the same time. This method insures the quality so often lacking in French fried potatoes. They should be golden brown on the outside and tender and mealy on the inside.

## Aids in House Cleaning.

When house-cleaning time comes 'round some women use such soap and scouring compounds as they happen to have handy, regardless of what they are cleaning. The following list, furnished by a home demonstration agent, includes various cleansers and where to use them:

*Naphtha soap.*—Coarse boards and heavy kettles.

*White soap.*—Woodwork, glasses, and china.

*Scouring compounds.*—Porcelain and windows.

*Steel wool.*—Removing wax from floors before applying new paint or varnish, cleaning aluminum ware.

*Floor wax.*—Floors and furniture.

*Kerosene.*—Outdoor disinfectant, pouring down drains, cleaning enameled sinks and tubs.

*Ammonia.*—Washing windows and linoleum.

*Borax.*—Softening water, washing hairbrushes, glassware, and cleaning enamel.

*Chloride of lime.*—Disinfectant for bathroom and sink.

*Whiting.*—Cleaning enamel paint and nickel.

*Linseed oil.*—Wiping woodwork, polishing iron ranges—burn cloth at once to prevent spontaneous combustion.

*Gasoline.*—Cleaning enameled tubs and bowls.

*Turpentine.*—Dusting waxed floors.

*Washing soda.*—Cleaning drains, traps, toilets, refrigerators, and rough and painted surfaces.

*Rottenstone.*—Polishing brass and copper.—*L. L.*

Since a primary object of the community canning kitchen is to secure the best returns for the time, effort, and capital invested, the use of modern labor-saving equipment, thoroughly adequate for the kind and volume of work to be done, will prove economical in the end.

## MONTANA LIVE-STOCK PAVILION.

By Geo. O. Sanford, Project Manager, Sun River Project.

There has recently been erected at Great Falls, Mont., a live-stock pavilion that is on a par with the best buildings of this class anywhere in the country. Montana has always been a big stock-raising State and of recent years the more progressive breeders have been giving their attention to developing fine herds of pure-bred stock and in several instances a national reputation has already been reached. In order to bring about the greatest possible development of high-grade stock it was necessary to have a convenient market place where seller and buyer could meet. This problem was considered by the live-stock men of northern Montana and the business men of Great Falls and in July, 1919, the Montana Livestock Pavilion Co. was organized with an authorized capitalization of \$50,000 of which one-half has been subscribed and paid. A substantial building has recently been completed at a cost of over \$30,000, and on April 19, 1920, it was appropriately dedicated, and in the evening the visitors from neighboring towns and States, including a special delegation from South St. Paul, were entertained in genuine western hospitality.

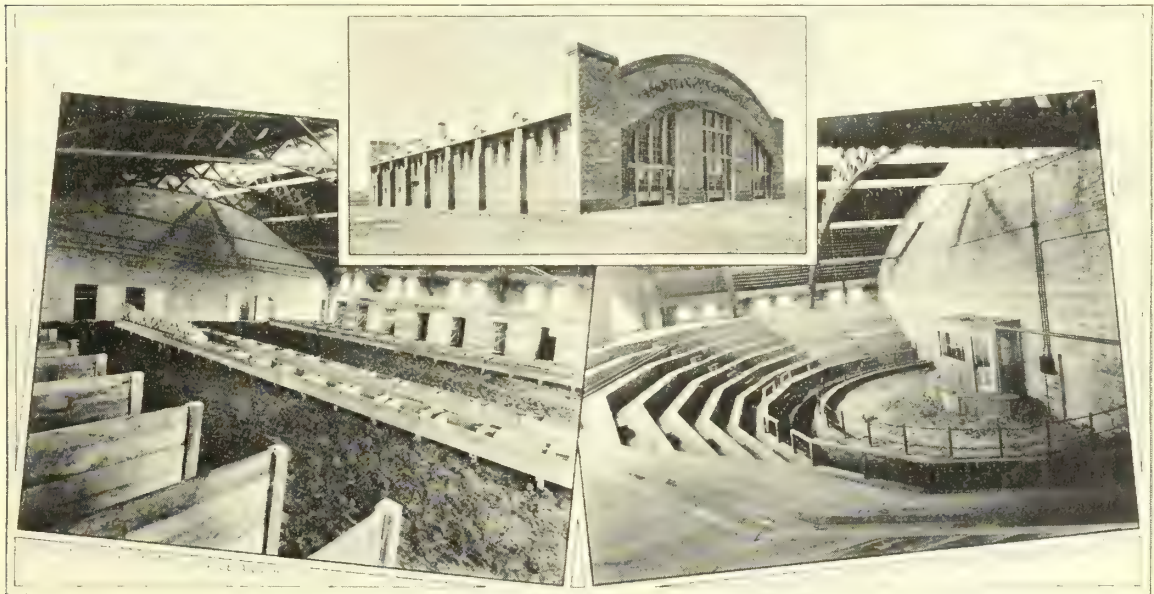
The building is located on a tract of 4 acres of land in the westerly portion of the city and easily accessible at the junction of the Great Northern and Milwaukee railroads. It is constructed of pressed brick and tiling, 100 feet wide by 150 feet long and as the roof is trussed there are neither posts nor pillars in the entire structure. The stable portion of the building is 100 feet square and

arranged to accommodate about 120 head of cattle, although if conditions require it can be made to handle about 175 head. Along the south wall of the stable portion there is a row of 25 single stalls, and along the north wall are 12 full box stalls. In the central portion and extending the full length of the stable are two double rows of mangers where the bulk of the show cattle will be tied. Suitable provisions have been made for feeding and watering the stock.

The sales arena, 50 feet by 100 feet in dimensions, occupies the west end of the building. The arena describes a half circle, 40 feet in diameter with a stand in the center for the auctioneer and a glass inclosed office for the sales clerk. The sales ring is separated from the arena by means of iron posts set in solid concrete, connected by heavy iron chains. Just outside this railing is a sunken path for the assistant auctioneers, which prevents obstructing the view of the spectators.

The amphitheater rises in a series of 8 rows of benches practically to the eaves of the building and gives comfortable seating capacity for about 600 or 800. Under the amphitheater are located the feed room, coal bin, and heating plant for warming the sales arena, a lounging room for the attendants, and a well-equipped wash room for taking care of the stock.

It is the intention of the pavilion company, in the event that the undertaking proves a success, which is anticipated, to subsequently discontinue the use of any portion of the



MONTANA LIVE-STOCK PAVILION.



building for stable purposes and to extend the arena and amphitheater so as to take in the entire floor space and to construct separate stables upon other parts of the tract owned by the company. This will then make it possible to conduct regular stock shows and to accommodate a much larger number of spectators.

This live-stock pavilion will be administered principally as an aid to the introduction of better live stock on the farms and ranches of Montana and its builders expect it to be an important factor in the swift development of Montana as a pure-bred live-stock State and rapid development along this line is expected within the next few years. The location of this sales pavilion at the door of Sun R ver project will give the farmers an opportunity to purchase pure-bred stock for the small irrigated farm and if the highest development of irrigated farming is to be reached the production of live stock must not be neglected.

It is not the intention of the pavilion company to conduct shows or sales but to provide the building for the use of live-stock associations. The major object of the company is to see that nothing but good stock is sold in this building and to insure this will require consignors to sign contracts guaranteeing that their stock is free from tuberculosis or other communicable diseases, and that animals of breeding age are actual breeders. They will also be required to point out any known defects in their animals. The company, as far as it has the ability, will see that nothing of an inferior grade shall be handled here. It is expected to eventually work into a pure-bred proposition.

In order that some income may be realized to meet expenses and interest charges, the pavilion company has adopted a tentative scale of fees which must be collected by exhibiting associations, as follows:

Cattle and horses: Ring fee, \$1 per head, and stall rental of 50 cents for the first day and 25 cents for each additional day.

Hogs and sheep: Ring fee of 50 cents per head and a pen rental of 25 cents per head for each three days or fraction thereof.

Mr. Shirley S. Ford is president of the association and Mr. Chester C. Davis secretary.

Since the dedication of the building two important sales have been held. The first was conducted by the Montana Shorthorn Breeders on May 6. At this sale 72 head of stock were sold for \$21,570. The top price paid was \$1,000 for a junior yearling bull, consigned by G. P. Keen, of Canton and purchased by L. A. Nutting, of Laurel. On May 21 the Montana Hereford Breeders held a sale at which 50 head of stock were sold for \$14,680. The top price at this sale was \$1,250 for a 2-year-old bull, sold by A. B. Crook to the Cooper-Hughes Lumber Co., of Spionkop. These two sales were held directly in the wake of the most disastrous agricultural period Montana has witnessed—three years of short crops and a winter of severe shortage of hay and feed. When these conditions are taken into consideration the association has every reason to feel satisfied with the results.

## APPROPRIATIONS COMMITTEE TO VISIT PROJECTS.

As we go to press plans are being perfected for an inspection trip to several of the national parks and reclamation projects by a number of members of the Committee on Appropriations of the House of Representatives. The following members of the committee and others have signified their intention to make the trip, in whole or in part:

Representatives Good (chairman), Cannon, Wood, Cramton, French, Shreve, Slemp, Byrns of Tennessee, Evans of Montana, Eagan, and Gallivan. Representative Sinnott, chairman of the Committee on Public Lands, will also be one of the party, as will Stephen T. Mather, Director of the National Park Service, Arthur P. Davis, Director of the Reclamation Service; J. B. Beadle, director's assistant; F. E. Weymouth, chief engineer, and R. F. Walter, assistant chief engineer. Mr. Davis will join the committee on the Newlands project. A stenographer and a representative of the railroads will also accompany the committee.



Route of Committee of Inspection.

The party plans to leave Chicago at 11.20 p. m., June 20, and to return to that point on July 31. A number of national parks will be visited and the following reclamation projects: June 24, North Platte project; June 26, Newlands project; July 6, Orland project; July 7, Klamath project; July 14, Yakima project; July 15, Umatilla project; July 17, Boise project; July 18, Minidoka project and American Falls; July 20-24, Shoshone and Huntley projects; July 29, Milk River project.

The route to be followed by the committee is shown on the accompanying map.

A system of fire insurance records intended especially for farmers' local mutual companies as an aid in simplifying and standardizing their bookkeeping is recommended by the United States Department of Agriculture and described in a bulletin recently issued.

## GUNNISON TUNNEL—CONSTRUCTION, OPERATION, AND MAINTENANCE.

By Fred D. Pyle, former Project Manager, U. S. R. S.

The Gunnison Tunnel was constructed for the purpose of diverting water from the Gunnison River to supplement the flow of the Uncompahgre River, in connection with the irrigation of the Uncompahgre project containing approximately 100,000 acres of irrigable land.

The construction of the tunnel was a subject of discussion in the Uncompahgre Valley for many years on account of the large area of fertile land and the inadequate water supply furnished by the Uncompahgre River. The State of Colorado undertook the construction of the tunnel, and spent approximately \$25,000 on a heading about 4 miles northwest of the present outlet. Surveys were undertaken in 1901 by the Geological Survey and were continued by the Reclamation Service after its organization.

The work undertaken by the State was transferred to the Federal Government and on March 14, 1903, the Uncompahgre project was approved in general terms by the Secretary of the Interior. Construction was approved on June 7, 1904.

A shorter and better location for the tunnel than the one chosen by the State was selected by a board of engineers on May 9, 1904. Plans and specifications were approved by a board of consulting engineers on July 10, 1904.

The first plans contemplated lining the tunnel throughout with concrete, using four classes of lining, depending upon the material encountered. These sections were later slightly modified and many sections in solid rock were left unlined.

The sections of concrete lining placed were as follows: (1) Hard material, floor flat 11 feet wide, sides vertical 8 feet 9 inches high to spring line, rise in circular arch 3 feet 4½ inches; (2) soft material, floor flat 10 feet wide, sides sloping so that width at spring line was 11 feet, spring line 9 feet 2 inches above floor, rise in circular arch 2 feet 3 inches. The grade throughout was uniform—2.02 feet per 1,000 feet. The unlined rock section was made with a minimum width of 12.5 feet and minimum height of 13 feet. The floor was concreted throughout. The length of the tunnel as completed is 30,582 feet, all one tangent except for 210 feet of reverse curve near the headgates.

On October 5, 1904, bids were opened for the construction of the tunnel. Ten bids were received. The Taylor-Moore Construction Co. was the lowest bidder and was awarded the contract, the work to be completed April 15, 1908. Excavation was commenced by the contractor on January 11, 1905. Owing to difficult work and financial troubles, the company turned the work over to the Government on May 27, 1905.

The work was readvertised and bids opened on September 26, 1905. Four bids were received. None was accepted and the work was continued to completion by Government forces.

Great difficulties were encountered by the Government in constructing the tunnel due to materials encountered,

mud, gravel, soft shale, etc., in the west portion, and extremely hard schist and granite with soft seams in the east portion. Several bad cave-ins occurred and hot water, gas, and swelling ground added to the difficulties. The tunnel was holed through on July 6, 1909. The official opening by President Taft was on September 23, 1909, and the first water carried for irrigation was delivered in the season of 1910.

Where the greatest difficulties were encountered the concrete was made heavier than originally planned and those places remain in excellent condition. Between stations 170 and 220 where no exceptional difficulties were encountered during the original construction the shale has since swelled and caused cracking and bulging of side walls, and bulging of the floor.

### CONDITION OCTOBER 1, 1913.

The floor was lined throughout in the original construction. The side walls and arch were lined only where the material was soft. There were no transitions between the unlined and the lined sections. The track and trolley had been left in place. There was considerable debris and concrete that had slopped from cars and forms in the tunnel. In numerous places the floor had bulged upward and the sidewalls bulged inward. Inspection also showed that in many places the concrete section was not full size on account of difficulties encountered during construction.

Sixty-five concrete bays had been placed in the side walls between stations 195+10 and 199+74 and 24 bays between stations 204+04 and 205+48 to strengthen the side walls during 1912. The floor between stations 189+38 and 192+33 had been reinforced with concrete bays in the spring of 1911 and the floor replaced between stations 192+40 and 199+70 in the spring of 1912, and between stations 215+20 and 220+05 in February, 1913.

### WORK, WINTER OF 1913-14.

During December, 1913, and January, 1914, 14 concrete bays were constructed in the walls between stations 193+68 and 194+24; the loose debris was cleared from the tunnel, the ties were removed, and the rails laid against the walls between stations 40 and 85, which was typical of the unlined sections, and between stations 200 and 240 in the lined sections. Gages, consisting of closed wooden boxes in which a strip of blue-print paper was fastened on which the maximum water level was indicated by a change in color, were installed every thousand feet through the tunnel, and the following readings obtained: July 2, 1914, 152 second-feet; July 15, 1914, 282 second-feet; September 10, 1914, 592 second-feet; October 1, 1914, 548 second-feet; October 15, 1914, 270 second-feet.



The following average values for the coefficient  $n$  in Kutter's formula were obtained:

Station.	Flow in second-feet.				
	152	270	282	584	592
10 to 170	0.0229	0.0262	0.0290	0.0305	0.0319
170 to 300 line	.0173	.0185	.0223	.0187	.0197

<sup>1</sup> Unlined except floor: 24 short lined sections totaling 3,082 linear feet.

In the above and in succeeding determinations of values of  $n$  it was impracticable to segregate the losses due to changes in size and other irregularities in the tunnel section. The values of  $n$  computed are therefore higher for both lined and unlined sections than would be the

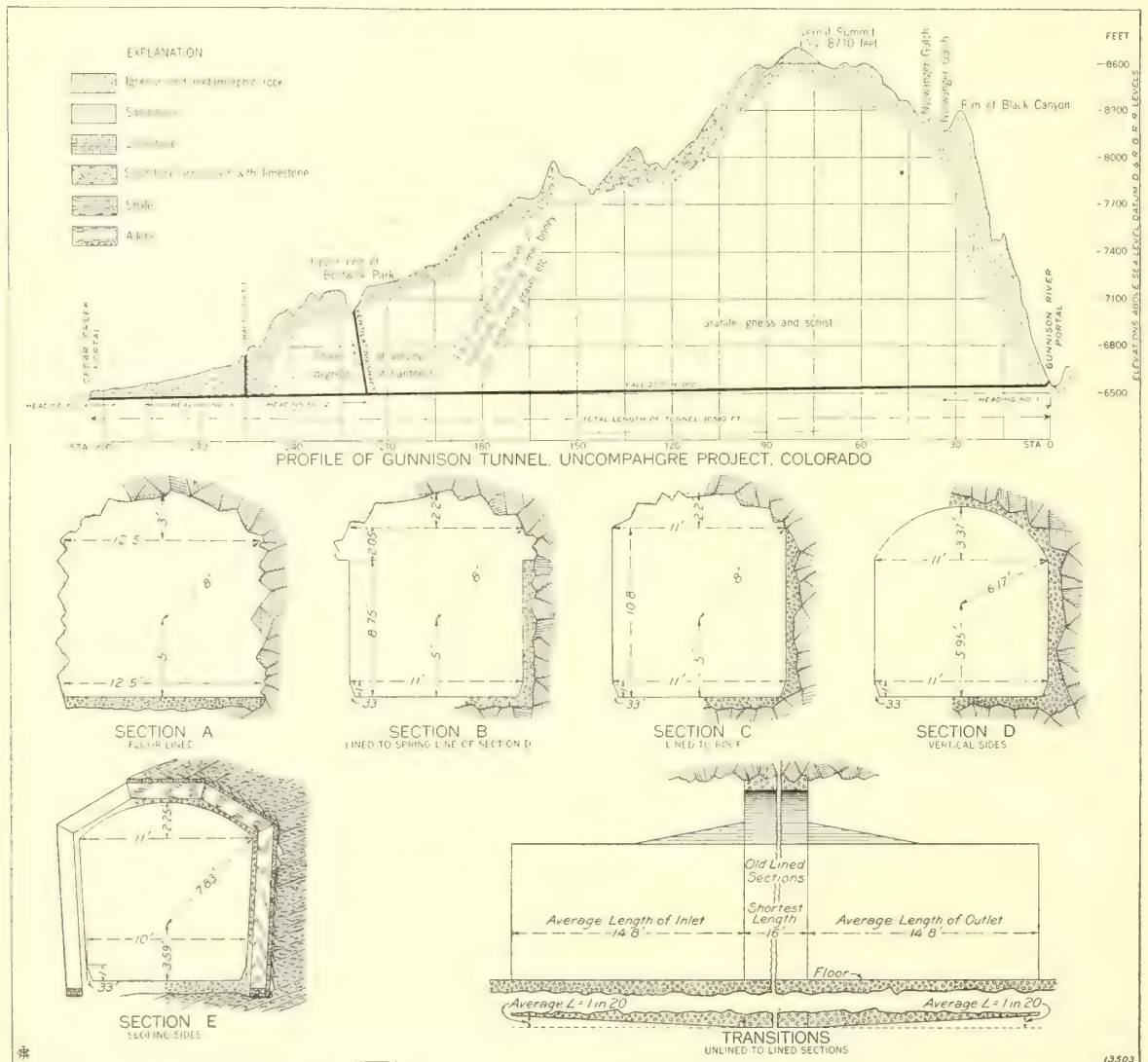
case had a rigid determination of these conversion losses been feasible.

Very little difference was noted in coefficients between sections where the ties were removed and sections where the ties were in place. The coefficients varied greatly for individual sections but were reasonably uniform for the various discharges, increasing with the discharge in the first portion of the tunnel and being erratic in the lower portion of the tunnel.

No work was done during the winters of 1914-15 and 1915-16.

#### WORK, WINTER OF 1916-17.

During the winter of 1916-17 extensive repair and construction work was undertaken; 203 feet of bulging side-walls were replaced, 98 feet of tunnel lined, 102 feet of



GUNNISON TUNNEL, UNCOMPAHGRE PROJECT, COLO.

tunnel lined to spring line, and 8 transitions constructed. The floor of the tunnel from station 200 to the end was carefully cleaned and from station 200+10 to 266+25 was plastered with  $\frac{1}{2}$  to 1 inch of mortar. The ties and all loose débris were removed from the tunnel and the rails laid against the sides.

An electrical system for determining the elevation of the water in the gage boxes while water was running was installed, but owing to excessive moisture conditions did not prove a success.

On April 18, 1917, the first trip was made through the tunnel with a Ford car, which demonstrated the practicability of using an automobile for inspection purposes. Before this time it had been necessary to walk, carrying ladders for inspecting the gages and supplies for making repairs to the gages when necessary. The first trip with an auto was made just after a head of 510 second-feet had been carried, and the watermarks were very distinct on the walls. These watermarks showed the contrasting effects of the square shoulders and of the transitions on the flow. At many of the square shoulders the water line was about a foot higher than it was 20 feet downstream, while at the transitions there was a difference of only about 0.2 foot. The water line also indicated considerable wave action at the gages in the concrete lined section which carried across the tunnel and could be noticed on the opposite wall 16 to 20 feet below the gages. Standing waves were in evidence in a number of places, especially in the narrow uneven sections between stations 185 and 200.

On July 18, 1917, a set of readings of the watermarks was made after a discharge of 650 second-feet.

On August 16 and 17 the discharge of the tunnel was tried out to determine the maximum capacity. With a reading of 13.1 feet on the east portal gate, the maximum water depth obtainable at that time and stage of the river, the discharge was 900 second-feet. An inspection of the watermarks was made on the 17th. Fairly definite marks were found in the lined sections, but more or less indefinite in the unlined sections.

The following is a comparison of the value of  $n$  as determined from these measurements:

Station.	Flow in second-feet.	
	650	900
10 to 170. Unlined (except floor and 22 short lined sections, totaling 3,292 linear feet), 8 transitions in place.....	0.0295	0.0235
170 to 300. Lined, floor partly smoothed.....	.0160	.0140

Although the methods used to determine the water level were crude, and the number of readings small, the results indicated improvement in flow conditions, due to removal of ties, the construction of short concrete sections and transitions, and the smoothing of concrete floor.

#### WORK, WINTER OF 1917-18.

During the winter of 1917-18, 137 feet of tunnel were lined complete, 420 feet to spring line, 573 feet to roof, and 22 transitions were placed. This work completed the transitions and the lining of all the short unlined sections, so that there were no unlined sections less than 207 feet long. The above also included lining at the upper end to station 7+09, the last 500 feet being to roof. All rocks projecting into a section 12.5 feet wide and 12.5 feet high were removed; 531 feet of bulging floor were replaced 6 inches below grade in order to increase the cross section of the tunnel; 847 feet of bulging wall were replaced and 101 concrete-lined bays were constructed in the side walls.

The rock section was found to be small in many places, especially in the first 4,000 feet, and it was enlarged to a minimum width of 12.5 feet, and minimum height of 13 feet.

During the spring of 1918 a set of metal cup gages was established in the tunnel. The cups were arranged 10 to the foot in the inside of a galvanized metal trough which was fastened to the gage boards by means of staples and nails.

On account of the heavy demand for water, readings were not secured during the irrigation season. Four readings were secured in October as follows: October 24, 500 second-feet; October 25, 390 second-feet; October 26, 325 second-feet; and October 27, 565 second-feet.

The following average values for the coefficient  $n$  were obtained:

Station.	Flow in second-feet.			
	325	390	500	565
10 to 170 <sup>1</sup> .....	0.0224	0.0236	0.0258	0.0255
170 to 300. Lined.....	.0163	.0163	.0169	.0161

<sup>1</sup> Unlined, except floor and 14 short lined sections totaling 3,820 linear feet.

These results were more uniform and encouraging than any previously obtained; 905 second-feet of water was the maximum carried in the tunnel in 1919, when the gages read 12.8 feet at East Portal and 6.65 feet at West Portal, as compared with 13.1 feet and 6.33 feet in 1917 for 900 second-feet.

#### WORK, WINTER OF 1918-19.

No work was done in the tunnel except for a thorough cleaning of the floor, removal of trolley wire and hangers, and the smoothing of a few spots of rough floor.

Eight sets of readings were secured as follows: 108 second-feet, October 31; 149 second-feet, November 3; 196 second-feet, October 27; 206 second-feet, November 4; 270 second-feet, October 28; 330 second-feet, October 28; 484 second-feet, October 29; 532 second-feet, October 30, 1919.



The following average values for Kutter's  $n$  were obtained:

Station.	Flow in second-feet.							
	108	149	196	206	270	330	484	532
10 to 170 <sup>1</sup> .....	0.021	0.023	0.021	0.021	0.022	0.025	0.022	0.024
170 to 300.....	.020	.019	.017	.017	.016	.016	.016	.016

<sup>1</sup> Unlined except floor and 14 short lined sections, totaling 3,820 linear feet.

#### WORK, WINTER OF 1919-20.

During January, 1920, a heavy wooden bulkhead was constructed to prevent the flow in the tunnel striking the side wall at the foot of the incline between station 2+09 and 2+39, causing swirls and back currents.

#### CONCLUSIONS.

The results of past investigations indicate that the coefficient  $n$  in Kutter's formula for the first 17,000 feet of the tunnel is 0.023 to 0.024, and for the remaining 13,000 feet, 0.016, which indicates that sections unlined, except for floor, may have a coefficient of 0.024 to 0.026.

An examination of the detailed data shows that in the section unlined except for floor, the value of  $n$  increases with the discharge which is to be expected as the percentage of rough perimeter increases with the depth, and that the value of  $n$  decreases in the lined section as the discharge increases.

On account of inability to eliminate standing waves, water splash, etc., all methods tried in determining the gage heights have left much to be desired.

It appears, both from observation and calculation, that the unlined sections are the deciding factors affecting the maximum discharge. With value of  $n=0.016$  the lined sections will carry 1,000 second-feet, and with values of  $n=.024$  and  $.026$  the unlined sections, with a width of 12.5 feet and depth of 12 feet, will carry 986 and 912 second-feet, respectively, with a possibility of reduced discharge if sealing takes place.

#### RICHARD J. COFFEY RESIGNS.

Richard J. Coffey has resigned as district counsel in the San Francisco office to enter private practice. Mr. Coffey has been with the service since April 2, 1912, and for nearly five years was connected with the legal division.

#### J. B. BEADLE NOW DIRECTOR'S ASSISTANT.

On June 11, 1920, the designation of Mr. J. B. Beadle, who for the past five years has held the position of secretary to the director, was changed to that of director's assistant. Mr. Beadle has been connected with the Reclamation Service since March 21, 1905.

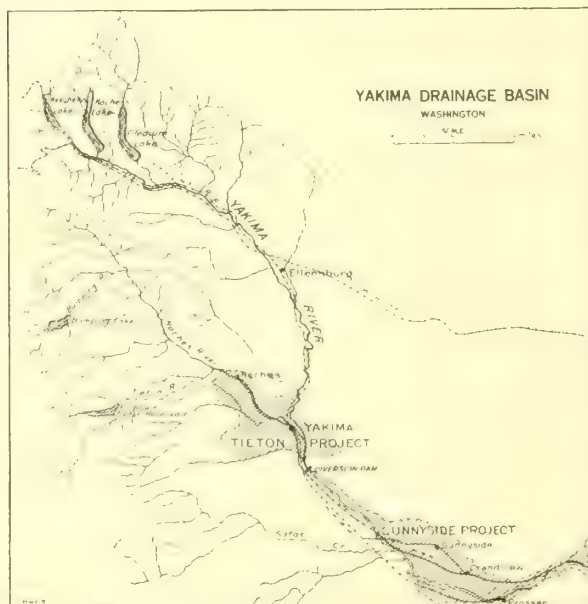
## HYDROGRAPHY OF THE YAKIMA RIVER FLOOD OF DECEMBER, 1917.<sup>1</sup>

By Paul Taylor, Hydrographer, Yakima Project, Wash.

The Yakima River, the source of water supply for the Yakima project in Washington, passed the greatest flood in its recorded hydrographic history during December, 1917. Owing to unprecedented meteorological conditions, this flood was of about 30 days' duration, discharging an unusual volume of water, with two distinct peaks 11 days apart. The flood was caused by warm weather with a small amount of snow on the ground, followed by excessive rainfall in the upper watershed.

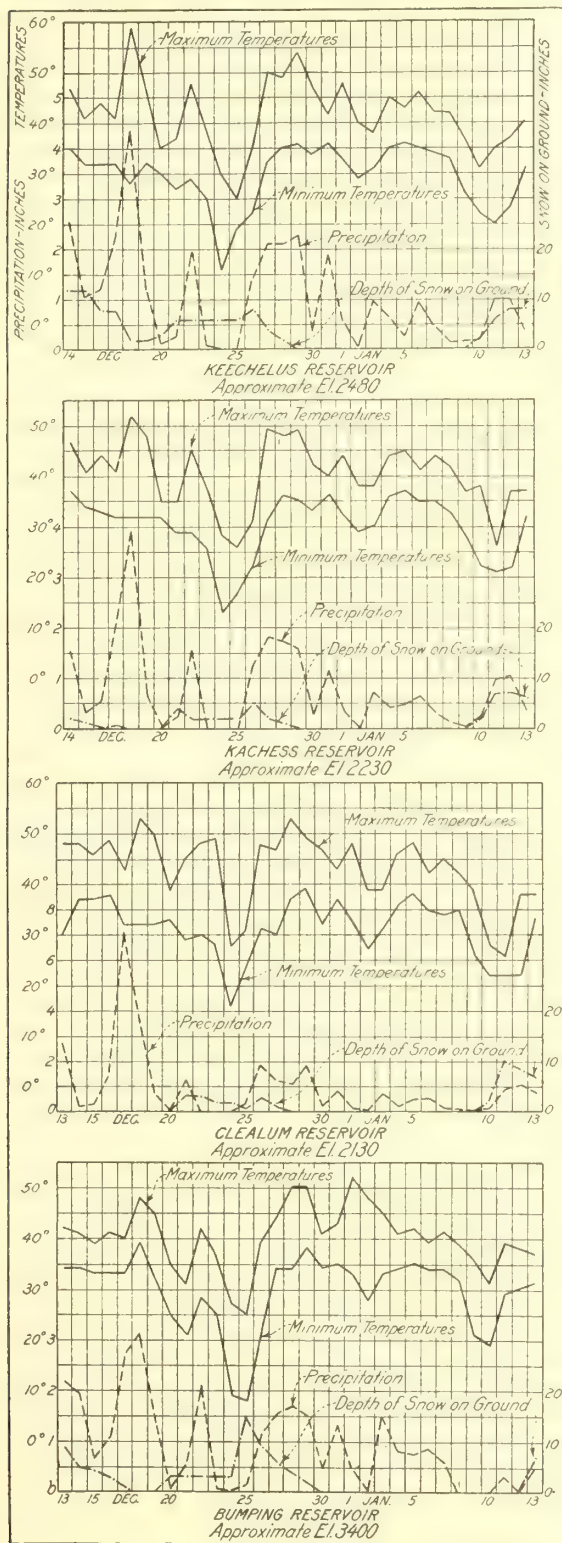
During the low flow period of the irrigation season, the Yakima is fed from four reservoirs, Lakes Keechelus, Kachess, Clealum, and Bumping, formed from natural lakes in the upper watershed of the Yakima River system. Surplus water, when available, is stored for irrigation in these reservoirs, the capacities of which are:

	Acre-feet.
Keechelus.....	152,000
Kachess.....	210,000
Clealum.....	20,800
Bumping.....	34,000



A watchman is on duty at each reservoir the year around, and it is usually possible to begin storing in some of the reservoirs as early as October. In order properly to handle the storing and distribution of the Yakima waters in which the Reclamation Service is interested,

<sup>1</sup>An illustrated article by former Project Manager R. K. Tiffany, giving details in regard to the successful protective work at the Sunnyside Canal diversion during this flood appeared in the RECLAMATION RECORD of June, 1918.



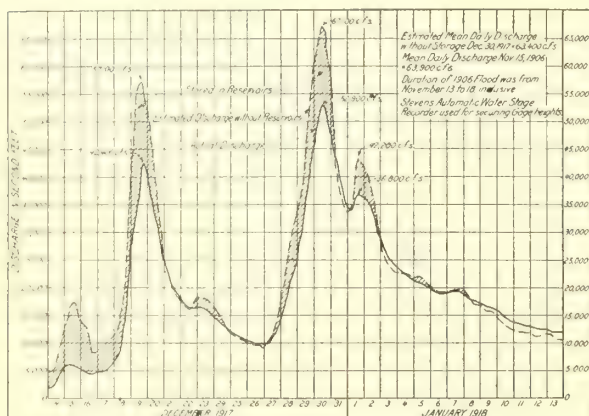
gaging stations are maintained throughout the year at each of the reservoirs, at Naches River below the Tieton River, and on the Yakima River at Cle Elum and at the Sunnyside Dam. In order to keep reliable records on these stations, most of them are equipped with Stevens's water stage recorders, which show a continuous graphical record of gage heights.

The 1917 irrigation demand had been heavy, and the summer and fall run-off light, so that by December 1 all reservoirs were nearly empty, except Kachess, which is a holdover unit and Bumping which is used in connection with winter power. At this time Kachess was about half and Bumping about one-third full.

From Figure 1 it will be noticed that heavy rainfall took place December 17 and 18, ranging from 3.06 inches at Bumping Lake to 7.10 inches at Lake Clealum in 24 hours. This, with the prevalent high temperatures, cut out considerable snow so that by December 19 the whole Yakima River system was in the highest flood since November 15, 1906. The maximum discharge reached at the Sunnyside Dam during this peak was 42,400 second-feet. The river channel carried the water readily without serious damage. By the 20th, the discharge had become materially reduced. However, subsequent warm weather with heavy precipitation caused a greater run-off on the 29th and 30th. Word was received from the watchman at Lake Clealum on the evening of the 29th that the lake gage read 18 at 5 p. m. with the lake rising. As this was 2 feet higher than the maximum recorded during the peak of the 19th, a serious flood was inevitable. The watchman, therefore, was instructed to protect the abutments with timbers, earth, and rock and to secure whatever help was necessary. By midnight, the right abutment was submerged and the water surface about a foot higher than the left abutment, where the outlet works were protected as much as possible. During the 29th, reports were received from the reservoirs every three hours and hourly from the gages at Cle Elum, Sunnyside Dam, and Naches below Tieton River. Shortly after midnight, all communication from the upper country was cut off from Yakima. By 4 a. m., the Northern Pacific Railroad bridge near Thorp in the Kittitas Valley, the Northern Pacific Railroad bridge across the Naches River near Yakima, and the Oregon Washington Railway and Navigation Co. bridge across the Yakima River below the Sunnyside Dam were out of commission. With this condition, attention was centered on the discharge over the Sunnyside Dam where a large crew was busy protecting the Sunnyside Canal bank. By noon of the 30th, the flood had reached its maximum with a discharge of 52,900 second-feet and shortly thereafter receded. The actual discharge at this station from December 15, 1917, to January 14, 1918, in 31 days was 1,224,000 acre-feet with a mean daily discharge for the period of 19,900 second-feet, a maximum mean daily discharge of 50,100 second-feet, and a minimum mean daily discharge of 4,660 second-feet. The maximum run-off for any previous calendar month of record for this station was 1,143,000 acre-



feet in June, 1903, with a maximum of 26,200 second-feet, a minimum of 11,200 second-feet and a mean daily discharge of 19,200 second-feet.



Estimated discharge without reservoirs at Sunnyside Dam.

Figure 2 shows the estimated discharge without reservoirs at Sunnyside Dam. The following table shows the percentage the flood was reduced by the presence of reservoirs in the system:

Station.	Effecting reservoirs	First peak.	Second peak.
		Per cent.	Per cent.
Yakima at Clealum.....	Upper Yakima....	49	40
Naches below Tieton.....	Bumping Lake....	12	14
Yakima at Sunnyside Dam.....	All reservoirs.....	19	21

The maximum flood of record previous to this time was that of November, 1906. In volume, it was less than that of 1917, but in intensity, greater. At the Sunnyside Dam the maximum mean daily discharge for the 1917 flood without reservoirs would have been 63,400 second-feet, while the actual for 1906 was 63,900 second-feet. During 1906 there was little storing capacity at any of these reservoirs, so that flood was only slightly affected by storage.

As a comparison of these floods, it is interesting to note that the peak run-off of the upper Yakima River system was greater in 1917 than in 1906, while on the Naches River system the reverse is true. The run-off for the station at the Sunnyside Dam for November, 1906, was 738,000 acre-feet. The maximum daily quantity for the 1906 flood on the Tieton River at the Tieton Canal headworks was 14,100 second-feet, compared to a peak discharge of 8,500 second-feet for 1917. The Naches River at the mouth discharged a daily quantity of 21,900 second-feet, compared to a peak discharge of about 16,000 second-feet during the 1917 flood.

It is proposed to increase the capacity of Lake Clealum to 381,000 acre-feet and to construct a reservoir at McAllister Meadows on the Tieton River having a capacity

of 187,500 acre-feet. On the Yakima River system the maximum floods take place in the fall or early winter when the reservoirs are normally low or empty. Assuming a holdover of 100,000 acre-feet in Kachess and the other reservoirs normally empty, with such a flood as that of 1917, the estimated peak discharge without reservoirs could have been reduced by the following percentages:

Gaging station.	Per cent reduction of peak flow without reservoirs due to completed storage unit.	
	First flood.	Second flood.
Yakima River at Cle Elum.....	Per cent. 83	Per cent. 90
Naches River below Tieton River.....	63	54
Yakima River at Sunnyside Dam.....	57	57

### CONSTRUCTION OF YUMA AUXILIARY PROJECT AUTHORIZED.

Secretary Payne, on June 8, 1920, authorized construction of the first unit of the Yuma auxiliary project, Arizona, and within a short time it is expected that work will be under way. Of the 532 farms in this unit which were offered for sale at public auction on December 10, 1919, and at weekly sales thereafter, 518 have been sold. Approximately 5,000 acres were disposed of during 12 hours of actual selling time at the rate of about \$100,000 per hour. The Secretary of the Interior placed a minimum price of \$25 per acre on the land, and the estimated cost of construction was \$200 per acre, but the sale averaged \$230 per acre, and of this amount 25 per cent has already been paid. Buyers from all sections of the country were present at the sale, and particular interest was manifested by citrus fruit growers from California and Florida.

The land is divided in tracts of 5 to 20 acres each, which will be devoted to the growth of citrus fruits, figs, dates, grapes, olives, and gardens. The weather records show that the lands are practically frostless, and crops can be harvested the year round.

There are upwards of 45,000 acres of land embraced in the Yuma auxiliary project, and the success which has so far attended the opening of the first unit presages wonderful development for that section. The value of the crops grown on the 52,000 acres in the valley and now under cultivation on the Yuma project proper amounted to \$7,012,000 for 1919, or \$134 per acre.

The increased demand for food by our increasing population must be met in the future largely by producing more per acre. Unless this is secured through the more general adoption of improved methods the increased production will result in ever-increasing cost per unit of product.—Secretary Meredith.

## FLOOD DAMAGES ON SALT RIVER PROJECT, ARIZONA.<sup>1</sup>

By W. R. Elliott, former General Superintendent and Chief Engineer.

During 1919 the Salt River project experienced unusual flood conditions, with the result that some damage was done to the works of the project in or adjacent to the Salt River.

The wet period started with unusual rainfall on the watershed during the last half of July and the first half of August, causing a gain in the Roosevelt Reservoir within a period of 20 days of over 230,000 acre-feet, which exceeds any former summer gain six times. Little or no damage to the works of the project resulted from this flood.

A second flood occurred in November, reaching its peak at the Granite Reef Dam at 8 o'clock on the night of the 27th. The average depth overflowing the entire length of the 1,000-foot dam was 7.65 feet, equivalent to approximately 100,000 second-feet. Approximately 95,000 second-feet of this water was from the Verde watershed and the

balance from that portion of the Salt River watershed that lies below the Roosevelt Dam. It represented the run-off from 6,000 square miles of watershed with an average rainfall for the three days of November 25, 26, and 27 of 2.66 inches. The Salt River above the Roosevelt Dam was in flood during the same period, but the entire flow was caught and impounded by the dam.

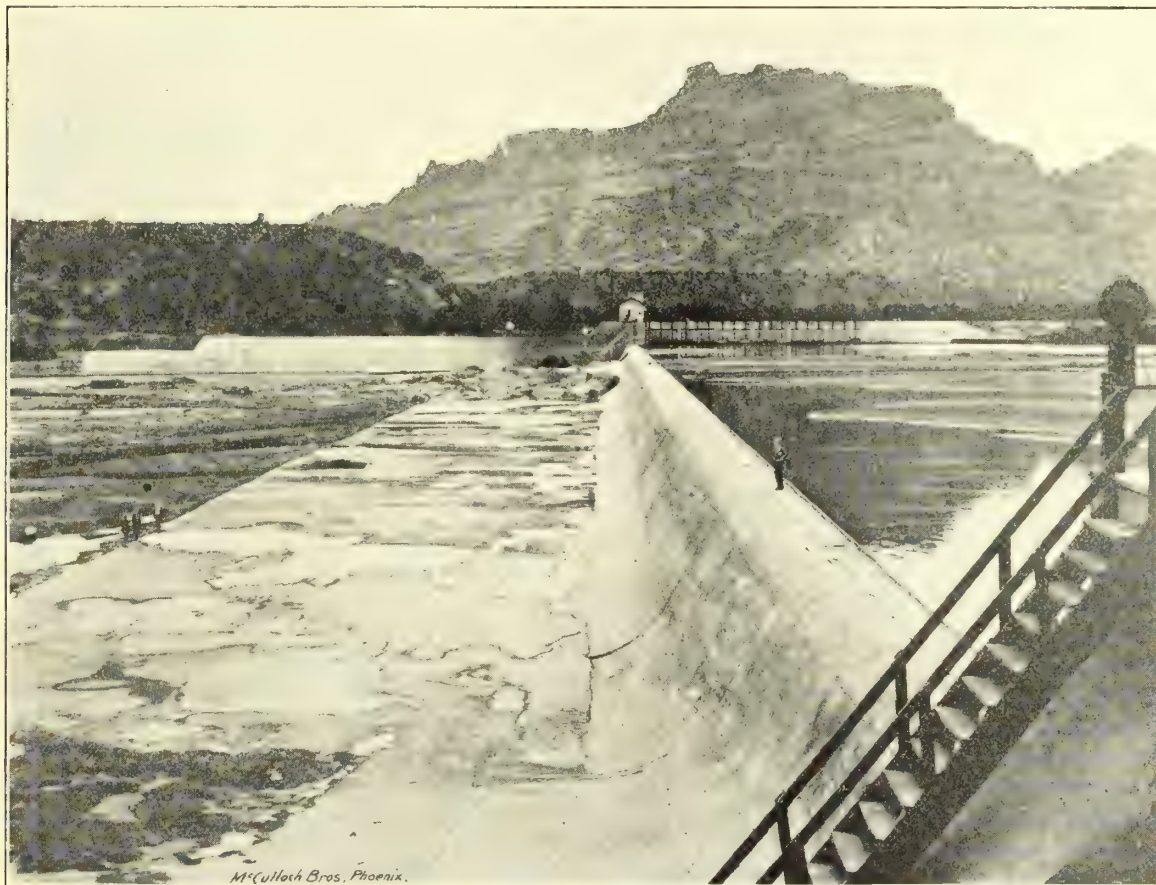
The reservoir gain for the storm period was as follows:

	Acre feet.
November 25 .....	3, 187
November 26 .....	2, 877
November 27 .....	5, 028
November 28 .....	84, 603

### GRANITE REEF DAM.

The result of the flood of Thanksgiving Day, 1919, was a loss of the protective apron of Granite Reef Dam, 75 feet

<sup>1</sup> The Salt River project has been operated by the water users since Nov. 1, 1917.



GRANITE REEF DAM. GENERAL VIEW LOOKING NORTH, SHOWING NEW APRON.



wide by 540 feet long, and a portion of a concrete cut-off wall located 75 feet downstream from the toe wall of the dam. This apron was a protection to that portion of the main dam that was not constructed on bedrock and was so placed to prevent water overflowing the dam from scouring the river channel and weakening the main cut-off or foundation walls of the dam. The apron originally constructed at the time the dam was built was partially washed away during the flood period of 1916, and had been replaced on gravel back fill in the form of slabs about 10 feet square and 14 to 16 inches thick, tied together with steel cable and other reinforcing material.

That some damage to the apron resulted from the flood of November, 1919, was learned after the flood had subsided, although the extent of the damage was not determined until the overflow was sufficiently low to make the necessary observations, when it was found that the repair work included replacing the damaged cut-off wall and the construction of a strip of the apron 75 feet by 540 feet with an average thickness of 6 feet.

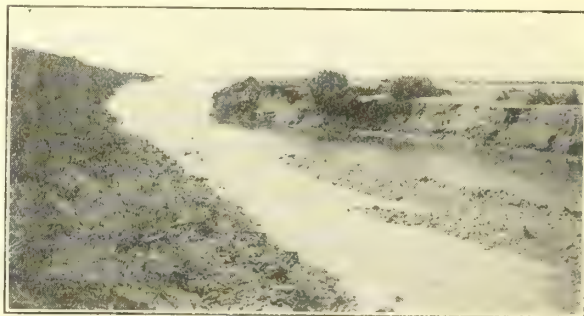
The actual work on the repairs was started December 19, 1919, and was completed February 7, 1920. The work was first carried on with a day shift only, but as soon as this organization was properly formed and sufficiently functioning a night crew was also organized and both were maintained until completion of the work. During the working period the organization consisted of an average of 375 men, 170 head of stock, and 68 wagons, together with the necessary auto trucks, scrapers, concrete mixers, pumps, etc. The concrete placed totaled 7,666 cubic yards; the cost of labor was \$45,377, and of material \$40,964.68, or a total of \$86,341.68 which represents a cost of \$11.26 per cubic yard.

The water surface of Roosevelt reservoir continued to rise, overflowing the spillways of the dam at 4.30 a. m., February 17, 1920, and reaching a peak overflow of 7.6 feet on February 23. This overflow was caused by the run-off of the rainfall which averaged 2.04 inches over the Verde River and Salt River watersheds for the three days of February 20, 21, and 22. This flood topped the Granite Reef Dam with a maximum overflow of 8 feet carrying approximately 107,000 second-feet of water, 67,000 second-feet of which was from the Verde River and 40,000 second-feet from the Salt River. The peak of this flood occurred at 11.30 p. m., February 22, 1920. As the repairs to the apron were completed just prior to this flood it was very gratifying to learn after the flood had subsided that no damage was done to the new work.

#### CONSOLIDATED CANAL.

The Consolidated Canal, one of the main canals supplying water to a large acreage on the south side of the project, was constructed parallel to the Salt River for a length of about  $2\frac{1}{2}$  miles. During the flood of 1916 about 400 feet of river bank of this canal was washed away. This bank was replaced at that time by a brush and rock dike placed a slight distance into the river from the location of the original bank. Willow trees were planted on this dike and in

the intervening space between the original bank and the dike for additional protection. As a protection to this portion of the canal, a brush and rock jetty was constructed in the river channel above the break at a point where the main channel of the stream would be confined to the opposite side of the river from the canal. This portion of the canal bank received the additional protection of a large sand bar; furthermore, the river bed on the far side of the channel was lower than the river bed adjacent to the Consolidated Canal bank.



South Consolidated Canal break, March 13, 1920.

This protection was sufficient to protect the portion of the bank damaged in 1916, but in keeping with the wandering disposition of this river it made a sudden diversion into the bank of the canal at a point about 300 feet below the old break, washing away 1,400 feet of bank, cutting deep holes at the river bed and the bottom of the canal, and making repairs impossible. To divert the water from the river into the canal was found to be impracticable, as soundings showed that a brush and rock dam would have to be constructed 18 feet high.

As the break occurred at the time the ranchers were preparing their land for cotton, it was essential to use every available method at our command to get this canal back in service. The method adopted was to construct a shunt canal around the damaged portion. To construct the shunt canal on the same grade as the old canal would require a cut averaging approximately 24 feet. Owing to the nature of the material through which this cut would run, which was composed of large boulders and considerable tightly cemented gravel, the time allowed to do this work made it impossible to move that quantity of material. It was found that by constructing a dam or bulkhead across the lower end of the canal above the break the water could be raised to an elevation that would permit the construction of the shunt canal with a maximum cut of 13 feet, 30 foot bottom with 1 to 1 side slopes, having a carrying capacity of 30,000 inches. The maximum water depth is 6 feet.

This work was started with an organization sufficient only for daylight work. A lighting system was then installed to flood-light the entire length of the portion of the canal to be reconstructed, and men and stock were added to the camp in sufficient numbers to permit carrying on the

work with two full crews, each working 10 hours per day, the full organization consisted of about 750 head of work stock and 600 men. Three 35-horsepower caterpillar tractors were put in service, but owing to the very rocky composition of the material they were out of service undergoing repairs too much of the time to be satisfactory, although they assisted considerably in breaking up the very hard cemented material.

Work was commenced on the shunt canal on February 25, 1920, and water was turned through it on March 31. Including the bulkhead across the Consolidated Canal approximately 70,000 cubic yards were moved. As the books had not been closed on this account when the article was written the exact cost can not be stated, but a conservative estimate would be \$75,000 to \$80,000.

The irrigation demand was cared for during the period the Consolidated Canal was out of service by utilizing all of the pumping plants so located that the water pumped could be delivered to lands under this portion of the system, and maintaining a continuous maximum flow in the Eastern Canal which is located above the Consolidated Canal.

Owing to the scarcity of stock in the Southwest it was necessary for the ranchers to turn over their ranch stock to the association in order that the work could be completed in time. The ranchers of the Salt River Valley as a whole responded very generously with both stock and men with the very gratifying result that the canal was again in service in ample time to assure full season production.

## SOIL ALKALI.<sup>1</sup>

By F. S. Harris, Director and Agronomist, Utah Agricultural Experiment Station.

The farmer of the West is likely to be very much upset at the mention of alkali, mineral, or salt, in connection with his land. These various names are applied to a condition which he usually knows little about except that it is bad. The exact nature of the substances called by these names and the character of the injury caused by them are very vague in his mind; but he knows that he wants nothing to do with alkali if he can help it.

The prevalence of alkali throughout the arid parts of the world makes it impossible for farmers in these regions to be entirely unaffected. The only alternative is to learn as much as possible about the condition and prepare to meet it squarely. Not all sections are equally affected by alkali, but the soils of no large irrigated area are entirely free from it.

The fact that the better lands have been taken makes it necessary next to use some of the soils that are to an extent affected by alkali if the farm products of the arid parts of the world are to be increased.

### WHAT IS ALKALI?

Any soluble salt that is present in the soil in quantities sufficient to injure crops may, in a rough way, be called alkali. This definition does not hold in a strictly chemical sense, but it will do for practical purposes. The word alkali is only one of the many names applied to soluble salts, but it is probably used more than any other.

Of the numerous soil materials that are soluble in water, only a few are likely to be present in anything like injurious quantities. For that reason alkali is usually rather simple in its composition. It is made up of any one, or a mixture, of the following salts: sodium chloride (common salt) sodium carbonate (washing soda), sodium sulphate (Glauber's salt), sodium nitrate (Chile saltpeter), and magnesium sulphate (Epsom salt). A number of other salts

are found in a few places, but the ones mentioned above are more common than any others.

Generally no single salt is found alone but the soil contains a mixture of the substances mentioned above. As a rule one group such as the chlorides, the carbonates, or the sulphates predominates in a given region. The nature of the salt will, of course, determine the best method to be employed to eliminate the trouble.

Alkali is often classified as black and white. All of the salts are themselves white, but sodium carbonate dissolves organic matter from the soil. This produces a black color, hence the name "black alkali." In a similar manner the nitrates produce a brown color. The carbonates and nitrates also cause a hard surface crust to be formed on the soil. This makes the passage of water difficult and interferes with the growth of crops. For this reason black alkali is more to be dreaded than white.

### HOW ALKALI INJURES CROPS.

Alkali causes injury to crops by preventing them from absorbing moisture and also by a direct corrosive action. Plants absorb water from the soil whenever the cell sap in the roots contains a higher concentration of dissolved material than is contained in the soil solution. If, on the other hand, the dissolved material in the soil becomes more concentrated than the cell sap, the plant is unable to take up moisture and consequently dies. It appears to be burned the same as if it had been subjected to drought.

If the soluble salt content of the soil is slightly less than that of the plant, the plant may not be killed, but it will be prevented from making a rapid growth. Seeds planted in a strongly alkali soil fail to germinate because they are unable to absorb water. Soils puddled by alkali are not favorable to crop growth. They do not allow a free movement of moisture and they are so hard that the plant is hindered from making its normal development.

<sup>1</sup> Circular No. 41, Utah Agricultural College Experiment Station, Logan, Utah.



## INDICATORS OF ALKALI.

It is impossible to tell how seriously a soil is affected with alkali by merely looking at it. A chemical analysis must be made. Of course, a superficial examination will help to tell many things about the soil, but such information may be misleading. For example, gypsum may be dissolved from the soil and brought to the surface, where it is deposited as a white layer. This might lead a person to think the soil highly alkaline, while as a matter of fact, it is impossible to dissolve sufficient gypsum to cause injury to crops. On the other hand, sodium chloride may give but little evidence of its presence even though there may be sufficient to cause decided injury to plants.

The native vegetation is one of the best indicators of the presence of alkali. For instance, if sagebrush is growing vigorously it may be assumed that the alkali content is not excessive. On the other hand, shadescale, greasewood, saltweed, and salt grass, all indicate the presence of dangerous quantities of alkali. The native vegetation and a chemical analysis of the soil to a depth of at least 6 feet make an excellent combination in determining the degree of contamination of alkali land.

## TOXIC LIMITS OF ALKALI.

It is difficult to place any very definite limit of toxicity on alkali soil, since toxicity is limited by several factors. The presence of abundant moisture and organic matter as well as a desirable soil texture help to reduce harmful effects.

The combination of salts must also be considered. For example, the sulphates are much less harmful than the carbonates, the nitrates, and the chlorides. If the alkali of a particular region is made up largely of sulphates it can be present in much larger quantities without causing injury than if the other salts predominate.

In general it may be said that soils containing more than 0.5 per cent of soluble salts where the larger part is chlorides, carbonates, or nitrates and 1 per cent where sulphates predominate are unsuitable for crop production without reclamation. Of course, these figures are modified by many conditions.

## CROPS FOR ALKALI LAND.

The crops to raise on alkali land depend on the degree of salinity of the soil, the uses that can be made of the crops, the markets, and other economic conditions as well as the climatic factors which determine what crops can be grown.

Date palms are very resistant to alkali and are profitable where climatic conditions are favorable, but the high temperature required for this crop removes it from consideration for most alkali lands. Likewise several salt weeds will grow on land highly charged with salt, but the use for these plants is limited. Salt grass is probably the most useful plant to grow on strong alkali land, but it is not nearly so good as many other forages and can not be recommended where better crops can be made to grow.

Among the ordinary farm crops the smaller grains can usually be raised to about the best advantage on alkali land. They are fairly resistant, and since they are not expensive to raise, the loss is not great in case of a failure. There is not a great difference in the resistance of barley, oats, rye, and wheat, although the order in which they are named probably is the order of their resistance. Not all varieties of any one of these crops have the same resistance. These crops are surer to succeed as a hay crop than for the grain.

Root crops, such as sugar beets, while not resistant in the seedling stage, are fairly good crops for land where the alkali does not give trouble till late in the season.

The legumes as a class do not do well in the presence of much alkali; particularly is this true of peas and beans. Sweet clover and alkali make fairly satisfactory crops for land of medium alkali content when a stand is once secured. As a type of cropping for Utah alkali land, three crops that may be used in a rotation on damp medium alkali land are sweet clover, sugar beets, and barley.

There are numerous crops having a resistance about equal to the three mentioned which might be substituted where conditions would justify. For example, sweet clover might be replaced by alfalfa, sugar beets by mangels, and barley by oats or wheat.

Corn and potatoes are not usually successful on alkali land.

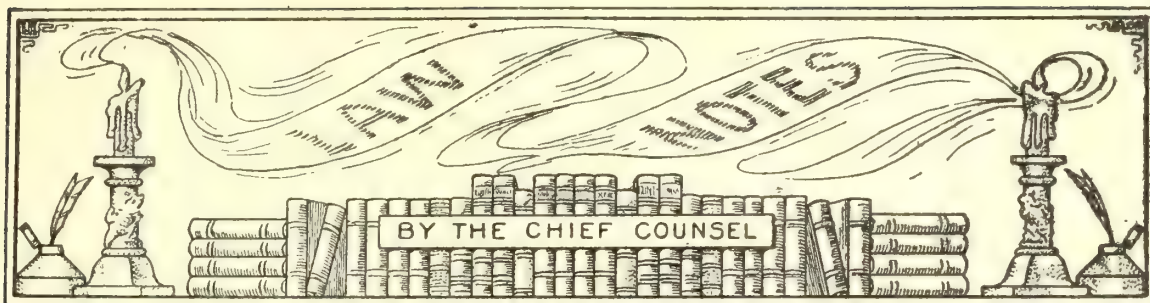
## RECLAMATION OF ALKALI LAND.

The uncertainty of securing a crop, together with the fact that a crop failure costs about as much as a success, makes it undesirable to farm land containing large quantities of alkali. The profits in farming are none too large even under the most favorable conditions, and if an additional handicap of an unproductive soil is added, success is almost impossible. If a farmer finds himself in possession of alkali land, he should investigate the possibilities of reclamation.

Nothing will destroy alkali. The only way to get it out of the land is to remove it by drainage or washing with water. Usually a covered tile drain system is the most successful method of reclaiming land. This, taken with the proper use of irrigation water, offers the quickest means of getting rid of the alkali. Open drains are used in some cases, but they have a number of disadvantages.

A number of means of preventing alkali from becoming more serious on a piece of land may be adopted. Among these are: (1) The cutting off of seepage water from higher land; (2) cultivation to reduce evaporation of water from the surface of the land and a consequent rise of salts from lower depths; (3) keeping the land constantly cropped; (4) the use of manure and organic matter to reduce surface evaporation, and (5) the proper use of irrigation water.

During the early stages of reclamation it is usually necessary to use the most resistant crops; but as the salt content is reduced other crops that may be more profitable can be introduced. While alkali in the soil is to be dreaded, it does not necessarily render the land valueless. Reclamation is not expensive when the improvement which it makes in the land is considered.



### Sundry Civil Appropriation Act.

(Extract from) AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1921, and for other purposes. (Act June 5, 1920, Public No. 246, 41 Stat., —.)

#### RECLAMATION SERVICE.

The following sums are appropriated out of the special fund in the Treasury of the United States created by the act of June 17, 1902, and therein designated "the reclamation fund":

For all expenditures authorized by the act of June 17, 1902 (Thirty-second Statutes, page 388), and acts amendatory thereof or supplementary thereto, known as the reclamation law, and all other acts under which expenditures from said fund are authorized, including salaries in the District of Columbia and elsewhere; examination of estimates for appropriations in the field; refunds for overcollections heretofore or hereafter received on account of water-right charges, rentals, and deposits for other purposes; printing and binding; law books, books of reference, periodicals, engineering and statistical publications, not exceeding \$1,500; purchase, maintenance, and operation of horse-drawn or motor-propelled passenger-carrying vehicles; payment of damages caused to the owners of lands or private property of any kind by reason of the operations of the United States, its officers or employees, in the survey, construction, operation, or maintenance of irrigation works, and which may be compromised by agreement between the claimant and the Secretary of the Interior; and payment for official telephone service in the field hereafter incurred in case of official telephones installed in private houses when authorized under regulations established by the Secretary of the Interior:

Salt River project, Arizona: For examination of project and project accounts, \$1,000;

Yuma project, Arizona-California: For operation and maintenance, continuation of construction, and incidental operations, \$435,000;

Orland project, California: For operation and maintenance, continuation of construction, and incidental operations, \$120,000;

Grand Valley project, Colorado: For operation and maintenance, continuation of construction, and incidental operations, \$208,000;

Uncompahgre project, Colorado: For operation and maintenance, continuation of construction, and incidental operations, \$174,000;

Boise project, Idaho: For operation and maintenance, continuation of construction, and incidental operations, \$774,000: *Provided*, That no part of this appropriation shall be expended for drainage except in irrigation districts formed under State laws and upon the execution of agreements for the repayment to the United States of the costs thereof: *Provided further*, That the foregoing proviso shall not be construed as an expression of opinion by the Con-

gress upon the litigation pending between the Government and the settlers on such project or in any manner prejudice such litigation;

King Hill project, Idaho: For operation and maintenance, continuation of construction, and incidental operations, \$320,000: *Provided*, That no expenditure shall be made from this appropriation that will bring the total expenditure for the King Hill project to an amount in excess of the amount stipulated in contract dated December 17, 1917, between the King Hill irrigation district and the Secretary of the Interior providing for the construction of the King Hill project by the United States Reclamation Service, unless and until a supplemental agreement has been executed by the King Hill irrigation district guaranteeing the reimbursement to the United States of the total amounts expended on the project;

Minidoka project, Idaho: For operation and maintenance, continuation of construction, and incidental operations, \$317,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1920;

Huntley project, Montana: For operation and maintenance, continuation of construction, and incidental operations, \$129,000;

Milk River project, Montana: For operation and maintenance, continuation of construction, and incidental operations, \$552,000;

Sun River project, Montana: For operation and maintenance, continuation of construction, and incidental operations, \$148,000;

Lower Yellowstone project, Montana-North Dakota: For operation and maintenance, continuation of construction, and incidental operations, \$83,000;

North Platte project, Nebraska-Wyoming: For operation and maintenance, continuation of construction, and incidental operations, \$1,000,000;

Newlands project, Nevada: For operation and maintenance, continuation of construction, and incidental operations, \$664,000;

Carlsbad project, New Mexico: For operation and maintenance, continuation of construction, and incidental operations, \$108,000;

Rio Grande project, New Mexico-Texas: For operation and maintenance, continuation of construction, and incidental operations, \$1,000,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1920;

North Dakota pumping project, North Dakota: For maintenance, operation, and incidental operations, \$119,000;

Umatilla project, Oregon: For operation and maintenance, continuation of construction, and incidental operations, \$170,000;

Klamath project, Oregon-California: For operation and maintenance, continuation of construction, and incidental operations, \$289,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1920;



Belle Fourche project, South Dakota: For operation and maintenance, continuation of construction, and incidental operations, \$120,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1920.

Strawberry Valley project, Utah: For operation and maintenance, continuation of construction, and incidental operations, \$86,000;

Okanogan project, Washington: For operation and maintenance, continuation of construction, and incidental operations, \$666,000: *Provided*, That no part of the moneys hereby appropriated shall become available for the construction of a permanent pumping plant until such action has been taken as may be satisfactory to the Secretary of the Interior to relieve the lands of the Okanogan project from liability for the obligations of the Methow-Okanogan irrigation district to the extent deemed necessary by the said Secretary to fully safeguard the security of the United States for the funds invested in the project.

Yakima project, Washington: For operation and maintenance, continuation of construction, and incidental operations, \$351,000;

Shoshone project, Wyoming: For operation and maintenance, continuation of construction, and incidental operations, \$459,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1920;

Riverton project, Wyoming: For the reclamation of lands within and in the vicinity of the ceded portion of the Wind River or Shoshone Reservation, including operation and maintenance, continuation of construction, and incidental operations, \$100,000: *Provided*, That said lands shall be subject to all the charges, terms, conditions, provisions, and limitations of the reclamation act and acts amendatory thereof or supplementary thereto, and suitable provision shall be made by the Secretary of the Interior in fixing the charges to provide for reimbursement of the entire expenditure in accordance with the reclamation law and other laws applicable to said lands;

Secondary projects: For cooperative and other miscellaneous investigations, \$50,000;

Imperial Valley irrigation investigation: For investigation and surveys of irrigation possibilities, Imperial Valley, California, including personal services in the District of Columbia and elsewhere, and for all other expenses authorized by the act of May 18, 1920, \$20,000;

Under the provisions of this act no greater sum shall be expended, nor shall the United States be obligated to expend, during the fiscal year 1921, on any reclamation project appropriated for herein an amount in excess of the sum herein appropriated therefor, nor shall the whole expenditures or obligations incurred for all of such projects for the fiscal year 1921 exceed the whole amount in the "reclamation fund" for that fiscal year;

Ten per centum of the foregoing amounts shall be available interchangeably for expenditures on the reclamation projects named; but not more than 10 per centum shall be added to the amount appropriated for any one of said projects;

Whenever, during the fiscal year ending June 30, 1921, the Director of the Reclamation Service shall find that the expenses of travel can be reduced thereby, he may, in lieu of actual traveling expenses, under such regulations as he may prescribe, authorize the payment of not to exceed 3 cents per mile for a motor cycle or 7 cents per mile for an automobile, used for necessary travel on official business;

In all, for the Reclamation Service, \$8,463,000.

For reimbursement to the reclamation fund the proportionate expense of operation and maintenance of the reservoirs for furnishing stored water to the lands in

Yakima Indian Reservation, Washington, in accordance with the provisions of section 22 of the act of August 1, 1914 (Thirty-eighth Statutes, page 604), there is appropriated, out of any money in the Treasury not otherwise appropriated, \$11,000.

### Investigation of Irrigation Possibilities in Imperial Valley, California.

AN ACT To provide for an examination and report on the condition and possible irrigation development of the Imperial Valley in California. (Act May 18, 1920, Public No. 208, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the Secretary of the Interior is hereby authorized and directed to have an examination made of the Imperial Valley in the State of California, with a view of determining the area, location, and general character of the public and privately owned unirrigated lands in said valley which can be irrigated at a reasonable cost, and the character, extent, and cost of an irrigation system, or of the modification, improvement, enlargement, and extension of the present system, adequate and dependable for the irrigation of the present irrigated area in the said valley, and of the public and privately owned lands in said valley and adjacent thereto not now under irrigation, which can be irrigated at a reasonable cost from known sources of water supply, by diversion of water from the Colorado River at Laguna Dam.

SEC. 2. That the said Secretary shall report to Congress not later than the 6th day of December, 1920, the result of his examination, together with his recommendation as to the feasibility, necessity, and advisability of the undertaking, or the participation by the United States, in a plan of irrigation development with a view of placing under irrigation the remaining unirrigated public and privately owned lands in said valley and adjacent thereto, in connection with the modification, improvement, enlargement, and extension of the present irrigation systems of the said valley.

SEC. 3. That the said Secretary shall report in detail as to the character and estimated cost of the plan or plans on which he may report, and if the said plan or plans shall include storage, the location, character, and cost of said storage, and the effect on the irrigation development of other sections or localities of the storage recommended and the use of the stored water in the Imperial Valley and adjacent lands.

SEC. 4. That the said Secretary shall also report as to the extent, if any, to which, in his opinion, the United States should contribute to the cost of carrying out the plan or plans which he may propose: the approximate proportion of the total cost that should be borne by the various irrigation districts or associations or other public or private agencies now organized or which may be organized; and the manner in which their contribution should be made; also to what extent and in what manner the United States should control, operate, or supervise the carrying out of the plan proposed, and what assurances he has been able to secure as to the approval of, participation in, and contribution to the plan or plans proposed by the various contributing agencies.

SEC. 5. That, for the purpose of enabling the Secretary of the Interior to pay not to exceed one-half of the cost of the examination and report herein provided for, there is hereby authorized to be appropriated the sum of \$20,000: *Provided*, That no expenditure shall be made or obligation incurred hereunder by the Secretary of the Interior until provision shall have been made for the payment of at least one-half the cost of the examination and report herein provided for by associations and agencies interested in the irrigation of the lands of the Imperial Valley.

## Sale of Improved Public Lands No Longer Needed For Federal Irrigation Purposes.

AN ACT To provide for the disposition of public lands withdrawn and improved under the provisions of the reclamation laws, and which are no longer needed in connection with said laws. (Act May 20, 1920, Public No. 212, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That whenever in the opinion of the Secretary of the Interior any public lands which have been withdrawn for or in connection with construction or operation of reclamation projects under the provisions of the act of June 17, 1902, known as the Reclamation Act and acts amendatory thereof and supplemental thereto, which are not otherwise reserved and which have been improved by and at the expense of the reclamation fund for administration or other like purposes, are no longer needed for the purposes for which they were withdrawn and improved, the Secretary of the Interior may cause said lands, together with the improvements thereon, to be appraised by three disinterested persons to be appointed by him and thereafter sell the same, for not less than the appraised value, at public auction to the highest bidder, after giving public notice of the time and place of sale by posting upon the land and by publication for not less than thirty days in a newspaper of general circulation in the vicinity of the land; not less than one-fifth the purchase price shall be paid at the time of sale, and the remainder in not more than four annual payments with interest at 6 per centum per annum, payable annually, on deferred payments.

SEC. 2. That upon payment of the purchase price the Secretary of the Interior is authorized, by appropriate patent, to convey all the right, title, and interest of the United States in and to said lands to the purchaser at said sale, subject, however, to such reservations, limitations, or conditions as said Secretary may deem proper: *Provided*, That not over one hundred and sixty acres shall be sold to any one person, and if said lands are irrigable under the project in which located they shall be sold subject to compliance by the purchaser with all the terms, conditions, and limitations of the Reclamation Act applicable to lands of that character: *Provided*, That the accepted bidder must, prior to issuance of patent, furnish satisfactory evidence that he or she is a citizen of the United States.

SEC. 3. That the moneys derived from the sale of such lands shall be covered into the reclamation fund and be placed to the credit of the project for which such lands had been withdrawn.

## Restoration of Public Lands Around Little Klamath Lake in Oregon and California.

AN ACT To restore to the public domain certain lands heretofore reserved for a bird reservation in Siskiyou and Modoc Counties, California, and Klamath County, Oregon, and for other purposes. (Act May 27, 1920, Public No. 226, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Secretary of the Interior be, and he hereby is, authorized and directed to determine and make public announcement of what lands in and around Little or Lower Klamath Lake, in Siskiyou County, California, and in Klamath County, Oregon, ceded to the United States by the State of California by the Act entitled "An Act authorizing the United States Government to lower the water levels of any or all of the following lakes: Lower or Little Klamath Lake, Tule or Rhett Lake, Goose Lake, and Clear Lake, situated in Siskiyou and Modoc Counties, and to use any part or all of the beds of said lakes for the storage of water

in connection with the irrigation and reclamation operations conducted by the Reclamation Service of the United States; also ceding to the United States all right, title, interest, or claim of the State of California to any lands uncovered by the lowering of the water levels of any or all of said lakes not already disposed of by the State," and ceded to the United States by the State of Oregon by an Act entitled "An Act to authorize the utilization of Upper Klamath Lake, Lower or Little Klamath Lake, and Tule or Rhett Lake, situate in Klamath County, Oregon, and Goose Lake, situate in Lake County, Oregon, in connection with the irrigation and reclamation operations of the Reclamation Service of the United States, and to cede to the United States all the right, title, interest, and claim of the State of Oregon to any and all lands recovered by the lowering of the water levels or by the drainage of any or all of said lakes," will eventually be uncovered and opened to agricultural development by the lowering of the water level of said lake. Title to all said lands can be acquired by homestead entry under the general homestead laws and the provisions of this Act and not otherwise: *Provided*, That all said lands shall forever be and remain subject to the right of the United States (a) to overflow the same or any part thereof for the purposes of irrigation by such systems of reservoirs and drainage and diking as now actually exist or may be hereafter constructed in Siskiyou County, California, and Klamath County, Oregon, and (b) to drain the water therefrom. All patents issued for the said lands shall expressly reserve to the United States such right of overflow and drainage, and the title and ownership of all minerals and mineral interests in such lands, including oil, are expressly reserved to the United States.

SEC. 2. That the Secretary of the Interior shall also determine and make public announcement of the proportionate part of the sum of \$283,225, heretofore expended from the reclamation fund in connection with the Klamath project, Oregon-California, that in the opinion of the Secretary of the Interior each acre of the said land should be assessed, and the proportionate part that each acre of privately owned land, similarly situated to the said lands hereby affected, should be assessed, to return to said reclamation fund in all the said sum of \$283,225.

SEC. 3. That the Secretary of the Interior be, and he is hereby, authorized and directed to cause said lands to be surveyed and opened to entry under the general homestead laws and the provisions of this Act: *Provided*, That none of said lands shall be opened to entry until the Secretary of the Interior shall have first made arrangement with the owners of lands in private ownership, similarly situated to the lands hereby affected, for the payment into the reclamation fund of the proportionate part of the sum of \$283,225, determined and apportioned by the Secretary of the Interior against said privately owned lands as provided in section 2.

SEC. 4. That in addition to all payments required by the general homestead laws there shall be paid by homestead entrymen the amount per acre assessed as provided in section 2 of this Act. Said payment shall be made in annual installments of \$1 per acre, except the last installment, which may be a fraction of a dollar: *Provided*, That the whole or any part of the amount so assessed may be paid by the entryman in a shorter period if he so elects. The first installment shall be paid at the time homestead application is filed and subsequent installments shall be due and payable on December 1 of each calendar year thereafter until the entire sum so assessed and apportioned against the lands is paid, and patent shall not issue for any of said lands until the sum so apportioned against said lands shall have been fully paid. Failure to pay any installment when due shall render the entry subject to cancellation, with a forfeiture of all moneys paid. All



assessments shall draw interest at the rate of 6 per centum per annum from their due date until paid. All moneys paid on account of such assessments shall, without diminution of any kind whatsoever, be covered into the reclamation fund.

Sec. 5. That those who served in the military or naval forces of the United States during the war between the United States and Germany and have been honorably separated or discharged therefrom or placed in the Regular Army or Naval Reserve shall have preference and prior right to file upon and enter said lands under the homestead laws and the provisions of this Act for a period of six months following the time said lands are opened to entry. That in opening said lands for homestead entry the Secretary of the Interior shall provide for the disposition thereof to the said soldiers, sailors, and marines, by drawing, under general rules and regulations to be promulgated by him: *Provided*, That the rights and benefits conferred by this Act shall not extend to any person who, having been drafted for service under the provisions of the selective service Act, shall have refused to render such service or to wear the uniform of such service of the United States.

Sec. 6. That no rights to make entry shall attach by reason of settlement or squatting upon any of the lands hereby restored before the hour on which such lands shall be subject to homestead entry at the land office, and until said lands are opened for settlement and entry as herein provided no person shall enter upon and occupy the same, and any person violating this provision shall never be permitted to enter any of said lands.

Sec. 7. That the Secretary of the Interior shall determine which of the lands now within the boundaries of the Klamath Lake Bird Reserve are chiefly valuable for agricultural purposes and which for the purpose of said reservation, and shall open to homestead entry those lands which are chiefly valuable for agricultural purposes: *Provided*, That the shore line of the lake, including the smallest legal subdivision of land adjoining the flow line, shall remain in the possession of the United States, but access may be provided to the lake for such canals as may be necessary for irrigation, drainage, and domestic water supply.

Sec. 8. That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this Act into full force and effect.

### Additional Compensation to Government Employees.

[Extract from] AN ACT Making appropriations for the legislative, executive, and judicial expenses of the Government for the fiscal year ending June 30, 1921, and for other purposes. (Act May 29, 1920, Public, No. 231, 41 Stat., —)

\* \* \* \* \*

Sec. 6. That all civilian employees of the Governments of the United States and the District of Columbia who receive a total of compensation at the rate of \$2,500 per annum or less, except as otherwise provided in this section, shall receive, during the fiscal year ending June 30, 1921, additional compensation at the rate of \$240 per annum: *Provided*, That such employees as receive a total of annual compensation at a rate more than \$2,500 and less than \$2,740 shall receive additional compensation at such a rate per annum as may be necessary to make their salaries, plus their additional compensation, at the rate of \$2,740 per annum, and no employee shall receive additional compensation under this section at a rate which is more than 60 per centum of the rate of the total annual compensation received by such employee: *Provided fur-*

*ther*, That the increased compensation at the rate of \$240 per annum for the fiscal year ending June 30, 1920, shall not be computed as salary in construing this section: *Provided further*, That where an employee in the service on June 30, 1919, has received during the fiscal year 1920, or shall receive during the fiscal year 1921 an increase of salary at a rate in excess of \$200 per annum, or where an employee, whether previously in the service or not, has entered the service since June 30, 1919, whether such employee has received an increase in salary or not, such employees shall be granted the increased compensation provided herein only when and upon the certification of the person in the legislative branch or the head of the department or establishment employing such persons of the ability and qualifications personal to such employees as would justify such increased compensation: *Provided further*, That the increased compensation provided in this section to employees whose pay is adjusted from time to time through wage boards or similar authority shall be taken into consideration by such wage boards or similar authority in adjusting the pay of such employees.

The provisions of this section shall not apply to the following: Employees paid from the postal revenues and sums which may be advanced from the Treasury to meet deficiencies in the postal revenues; employees of the Panama Canal on the Canal Zone; employees of the Alaskan Engineering Commission in Alaska; officers and members of the Metropolitan police of the District of Columbia and the United States Park police who receive the compensation fixed by the Act approved December 5, 1919; officers and members of the Fire Department of the District of Columbia who receive the compensation fixed by the Act approved January 24, 1920; employees paid from lump-sum appropriations in bureaus, divisions, commissions, or any other governmental agencies or employments created by law since January 1, 1916, except employees of the United States Tariff Commission who shall be included and except that employees of the Bureau of War Risk Insurance shall receive increased compensation at one-half the rate allowed by this section for other employees: *Provided*, That employees of said bureau who are compensated at rates below \$400 per annum shall receive additional compensation only as the rate of 60 per centum of the annual rates of compensation received by such employees. The provisions of this section shall not apply to employees whose duties require only a portion of their time, except charwomen, who shall be included; employees whose services are utilized for brief periods at intervals; persons employed by or through corporations, firms, or individuals acting for or on behalf of or as agents of the United States or any department or independent establishment of the Government of the United States in connection with construction work or the operation of plants; employees who receive a part of their pay from any outside sources under cooperative arrangements with the Government of the United States or the District of Columbia; employees who serve voluntarily or receive only a nominal compensation, and employees who may be provided with special allowances because of their service in foreign countries. The provisions of this section shall not apply to employees of the railroads, express companies, telegraph, telephone, marine cable, or radio system or systems taken over by the United States, and nothing contained herein shall be deemed a recognition of the employees of such railroads, express companies, telegraph, telephone, marine cable, or radio system or systems as employees of the United States.

Section 6 of the Legislative, Executive, and Judicial Appropriation Act approved May 10, 1916, as amended by the Naval Appropriation Act approved August 29, 1916, shall not operate to prevent anyone from receiving the additional compensation provided in this section who otherwise is entitled to receive the same.

Such employees as are engaged on piecework, by the hour, or at per diem rates, if otherwise entitled to receive the additional compensation, shall receive the same at the rate to which they are entitled in this section when their fixed rate of pay for the regular working hours and on the basis of three hundred and thirteen days in the said fiscal year would amount to \$2,500 or less: *Provided*, That this method of computation shall not apply to any per diem employees regularly paid a per diem for every day in the year.

So much as may be necessary to pay the additional compensation provided in this section to employees of the Government of the United States is appropriated out of any money in the Treasury not otherwise appropriated.

So much as may be necessary to pay the increased compensation provided in this section to employees of the government of the District of Columbia is appropriated, one-half out of any money in the Treasury not otherwise appropriated and one-half out of the revenues of the District of Columbia, except to employees of the Washington Aqueduct and the water department, which shall be paid entirely from the revenues of the water department, and to employees of the minimum wage board and the playgrounds department, which shall be paid wholly out of the revenues of the District of Columbia.

So much as may be necessary to pay the increased compensation provided in this section to persons employed under trust funds who may be construed to be employees of the Government of the United States or of the District of Columbia is authorized to be paid, respectively, from such trust funds.

Reports shall be submitted to Congress on the first day of the next regular session showing for the first four months of the fiscal year the average number of employees in each department, bureau, office, or establishment receiving the increased compensation at the rate of \$240 per annum and the average number by grades receiving the same at each other rate.

\* \* \* \* \*

### Special Provisions of the Appropriation Act for the Department of Agriculture.

[Extracts from] AN ACT Making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1921. (Act May 31, 1920, Public, No. 234, 41 Stat., —.)

\* \* \* \* \*

GENERAL EXPENSES, BUREAU OF PLANT INDUSTRY: \* \* \* For investigations in connection with western irrigation agriculture, the utilization of lands reclaimed under the reclamation act, and other areas in the arid and semiarid regions, \$52,380.

\* \* \* \* \*

GENERAL EXPENSES, BUREAU OF SOILS: \* \* \* For examination of soils to aid in the classification of agricultural lands in cooperation with other bureaus of the department and other departments of the Government, \$15,000.

\* \* \* \* \*

GENERAL EXPENSES, BUREAU OF PUBLIC ROADS: \* \* \* For investigating and reporting upon the utilization of water in farm irrigation, including the best methods to apply in practice; the different kinds of power and appliances, and the development of equipment for farm irrigation; the flow of water in ditches, pipes, and other conduits; the duty, apportionment, and measurement of irrigation water; the customs, regulations, and laws affecting irrigation; for the purchase and installation of equipment for experimental purposes; for the giving of expert advice and assistance; for the preparation and illustration of reports and bulletins on irrigation; for the employment of assistants and labor in the city of Washington and else-

where; for rent outside of the District of Columbia; and for supplies and all necessary expenses, \$62,440;

For investigating and reporting upon farm drainage and upon the drainage of swamp and other wet lands which may be made available for agricultural purposes; for preparing plans for the removal of surplus water by drainage, and for giving expert assistance by advice or otherwise in the drainage of such lands; for conducting field experiments and investigations concerning the construction and maintenance of farm-drainage work; for investigating and developing equipment intended for the construction and maintenance of farm-drainage structures; for the purchase of materials and equipment; and for preparing and illustrating reports and bulletins on drainage; and for the employment of assistants and labor in the city of Washington and elsewhere; for rent outside of the District of Columbia, and for supplies and all necessary expenses, \$53,760;

\* \* \* \* \*

DEMONSTRATIONS ON RECLAMATION PROJECTS: To enable the Secretary of Agriculture to encourage and aid in the agricultural development of the Government reclamation projects; to assist, through demonstrations, advice, and in other ways, settlers on the projects; and for the employment of persons and means necessary in the city of Washington and elsewhere, \$30,000.

\* \* \* \* \*

### Removal of Garden City Project Liens.

AN ACT For the relief of the Garden City (Kansas) Water Users' Association, and for other purposes. (Act June 5, 1920, Public, No. 238, 41 Stat., —.)

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That the contracts affecting lands in the Garden City project of the Reclamation Service in Finney County, Kansas, heretofore entered into between the Finney County Water Users' Association of Finney County, Kansas, or with individual landowners, and the Secretary of the Interior for the supply and use of water from the irrigation plant of the United States be, and the same are hereby, canceled and relieved; and the liens upon the lands in said county created by such contracts are hereby released and discharged.

### Reconveyance of Lands Donated For Use in Federal Irrigation Projects.

The Secretary of the Interior, on June 3, 1920, requested the introduction in the Congress of the following bill:

A BILL Authorizing the Secretary of the Interior in certain cases to reconvey real property donated for use in connection with Federal irrigation projects.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That where real property or any interest therein heretofore has been, or hereafter shall be, donated and conveyed to the United States for use in connection with a Federal irrigation project established under the act of June 17, 1902 (thirty-second Statute, 388), and the Secretary of the Interior decides not to utilize the donation, he is authorized to reconvey such property to the donating grantor, or the heirs, successors, or assigns of such grantor.

— Ottamar Hamel.

Inclosed find post-office order for 50 cents for renewal subscription to RECLAMATION RECORD. I value the RECORD above all other irrigation or farm papers.—From Oroville, Wash.



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.*

HUGH A. BROWN, EDITOR.

### SUBSCRIPTION BLANK.

#### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

CHIEF CLERK,

U. S. Reclamation Service,  
Washington, D. C.

DEAR SIR: I am NOT a water user on one of the projects of the U. S. Reclamation Service, but wish to receive the RECLAMATION RECORD each month.

I inclose herewith 50 cents for a year's subscription, beginning with the current issue.

-----  
(Name.)

-----  
(Street number.)

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(City and State.)

(Write Plainly.)

NOTE.—Mail the above blank **TO-DAY**. Send money order or New York draft, made payable to Special Fiscal Agent, U. S. Reclamation Service. Do NOT send stamps.

Dealing as it does in official and therefore authoritative way, with the great irrigation projects installed by the United States, the RECLAMATION RECORD can be relied upon to give exact account and fair report as to construction cost and resulting service of these projects. The great dams and the reservoirs behind them are the greatest constructive monuments in the great West and among the greatest in the world in an engineering way.—*The Project Bakersfield, Calif.*

### DIRECTOR DAVIS MARRIED.

Mrs. Clara W. MacNaughton announces the marriage of her daughter, Marie, and Mr. Arthur Powell Davis, director of the Reclamation Service, on June 19, 1920. The Rev. Dr. Wallace Radcliffe of the New York Avenue Presbyterian Church, Washington, D. C., was the officiating clergyman.

Mr. and Mrs. Davis left for the Pacific Coast to be gone about two months.

### CONGRESSMEN LAUD WORK OF RECLAMATION SERVICE.

Representative N. J. Sinnott, chairman of the Public Lands Committee of the House of Representatives, made the following remarks in the House on May 8, 1920, during the discussion of the provisions in the sundry civil bill relating to the Reclamation Service:

"The Reclamation Service is one of the great activities of the Government. I think that the money invested in the reclamation of arid lands is one of the best investments the Government ever made. It has expended something like \$120,000,000 in the reclamation of the arid lands in the 16 Western States and Texas, and, according to the figures given for crop production in the year 1918, there was produced from that investment of something like \$120,000,000 about \$90,000,000 in that one year. Certainly that is a good investment.

"The Reclamation Service is presided over by one of the most modest but ablest men in the United States, Director Davis, a great engineer, a man who is known all over the world for his ability along engineering lines. He was chosen by the Government of China to go to that country to investigate some of their engineering problems. At a meager salary, probably one-fifth of what he could earn in private life, he is unselfishly giving his great talents to the public service. The operations of Director Davis have resulted already in reclamation projects as monumental as the very Pyramids themselves. I think those projects will possibly outlast the Pyramids, and they will certainly be of far greater benefit to mankind.

"I say this to show you that I am heartily in favor of the Reclamation Service, of its director, and of its present force."

Reference has been made heretofore in the Record (January, 1920) to the bill (S. 3477), introduced by Senator Smoot, to increase, without expenditure of Federal funds, the opportunities of the people to acquire rural homes. This bill passed the Senate and was favorably reported to the House from the Committee on Irrigation of Arid Lands, but was not finally acted upon prior to adjournment.

The following extract is from the report of the committee:

"The initiative for development under this plan must be taken by landowners or local communities. They will apply to the Secretary of the Interior and ask him to use

the engineering facilities of the Reclamation Service to investigate a proposed project, accompanying their application with the estimated cost of such investigation. If their project is approved as sound and feasible from an engineering, economic, and agricultural standpoint, the Secretary enters into a contract with the landowners under which he agrees to organize and develop the project precisely as is now done under the reclamation law, with the important difference that the project is constructed wholly at the expense of the landowners. In financing it they will enjoy the benefit of the fact that able and disinterested engineers, economists, and administrators, representing the Reclamation Service, the greatest engineering organization in the world, with 17 years' experience in the reclamation of arid lands, has approved the project."

### RECENT PROJECT BOOKLETS.

#### Yuma project, Arizona.

Through the courtesy of Col. B. F. Fly, of Yuma, Ariz., we have received a copy of a profusely illustrated and highly attractive booklet, issued by the Yuma County Commercial Club, Yuma, Ariz., setting forth "facts, figures, and pictures of the most promising city and the most richly endowed section of the great Southwest," as the booklet has it.

Recognition of what the Reclamation Service has meant in the development of the project is generously given, as indicated by the following extracts:

"The one great institution of Yuma County, of which the inhabitants are justly proud, is the United States Reclamation Service, Mr. Walter Schlecht, project manager. It was the Reclamation Service that 'put Yuma on the map.' Prior to 1905, when the Government first began the construction of the works necessary to reclaim the lands embraced within the project, Yuma was a mere whistling station in a barren desert. True, reclamation of a few thousand acres in Yuma Valley had been attempted, and for a few years successfully irrigated, prior to that time, but Yuma was best known throughout the world as being 'the hottest place this side of hades.' It was supposed to be inhabited principally by rattlesnakes, Gila monsters, jack rabbits, and Yuma Indians. The United States Reclamation Service has changed this general opinion, for Yuma project is now known from one end of the world to the other as the richest reclamation project in the world. (Editor's note: If any other project wishes to dispute this, the pages of the RECLAMATION RECORD are open.)

"Prior to the construction of the Yuma project by the United States Reclamation Service, lands within the limits of the project commanded merely a nominal price,

from \$5 to \$25 per acre. At the end of 1919 these same lands commanded a ready sale at from \$200 to \$700, according to location."

The booklet is a credit to the project and to its compilers.

#### Burley, Idaho, Minidoka Project.

"Less than 10 years ago a few small frame buildings, looking rather desolate and lonesome, marked a railroad siding which was named Burley, in honor of D. E. Burley, a prominent official of the O. S. L. Railway Co.

"To-day a town claiming a population of something over 5,000 people stands on the same ground, bears the same name, and is known as the liveliest town in Idaho."

These are the opening paragraphs of an informative, illustrated booklet issued recently by the Burley Commercial Club "for the purpose of answering numerous inquiries concerning the opportunities to be found here, and to give reliable and substantial information regarding the section and its resources and possibilities." Included in the booklet is the following concerning the work of the Reclamation Service:

"A monument to the efficiency of the United States Reclamation Service, the Minidoka irrigation system stands as one of the best yet built in the West.

"The task was a large one, and of the kind that Government operation is needed to accomplish successfully."

The booklet marks another forward chapter in the life of this progressive community.

### RECLAMATION ABROAD.

#### Notes From Various Sources.

##### Draining Swamp Lands in New Zealand.

There are in New Zealand large areas of swamp lands, aggregating several hundred thousand acres, of which about 40,000 acres had been reclaimed at the end of 1919, at a total cost of \$1,662,119. The cost of drainage per acre in the past was from \$24 to \$54.

A swamp area south of Auckland, comprising about 20,000 acres, of which a large portion has been drained, has increased in value in excess of \$4,866,500, and it is generally conceded that the majority of swamp lands will become the best farming and grazing lands of the Dominion as soon as they are properly drained, which as a rule is not very difficult.

The New Zealand Government is considering extensive drainage developments, and the minister of lands expects to expend during 1920 at least \$1,000,000 in this work. Mr. J. B. Thompson, chief drainage engineer, will visit the United States to study conditions.—*Consul General Alfred A. Winslow.*



## HOMER HAMLIN—AN APPRECIATION.

By J. B. Lippincott, Los Angeles, Calif.

Mr. Homer Hamlin, member of the American Society of Civil Engineers, who died suddenly in Washington on May 14, 1920, was a distinguished member of the engineering profession of the Southwest and a brilliant example of the type of man who is a real public benefactor. Modest, hard-working, conservative, and sound in judgment, he has assisted materially in making the region of his adoption a place where a much greater number of people can happily



Homer Hamlin.

reside. There is no nobler work that a man can do than to convert deserts into gardens, to improve the sanitation of cities, and add to the commercial development of the country by the construction of harbors, as Mr. Hamlin has done. With all this he was of modest nature, shunning publicity and avoiding ostentation over his accomplishments.

Mr. Hamlin as an engineer has aided materially in the building of important municipal engineering works in San Diego and Los Angeles. He constructed some of the largest street tunnels in Los Angeles, designed and carried

out the early construction of the Los Angeles Harbor, and completed the great outfall sewer to the sea. He developed standard types of street paving and built many other works of equal public importance.

Although Mr. Hamlin was largely a self-educated engineer, he was a natural student. In addition to his other technical studies he specialized extensively in geological research. This was his recreation. His report on the "Water Resources of the Salinas Valley," written for the United States Geological Survey in 1901-2, was one of his more important geological studies. He was also identified with the early development of some of the oil fields in southern California. He became identified with the United States Reclamation Service soon after the passage of the reclamation act in 1902, and was project engineer at Yuma until August, 1906, at which time he became city engineer of Los Angeles, in which office he served until July, 1917. Since this latter date Mr. Hamlin was engaged in private practice in California, devoting part of his time to work for the reclamation service in Arizona. A few months prior to his death he made a trip down the Colorado River from near the mouth of the Virgin tributary to Yuma. This expedition was devoted particularly to the study of the possibilities of a great storage enterprise at the lower end of the Grand Canyon at a point known as Boulder Canyon.

His death in Washington was a severe shock to all. He died alone in his room at the Willard Hotel from a cerebral hemorrhage. He was there at the time in the interests of the Salt River Valley Water Users' Association. Mr. Hamlin was 56 years of age. He was born at Pine Island, Minn. He leaves a widow, a son, and a daughter, who are residing in Los Angeles. Mr. Hamlin's death is not only regretted by his friends, but it is also a distinct loss to the Reclamation Service and to the community in which he has made his home.

## MAY WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

May in the Western States was chiefly dry and cool. The lowest temperatures occurred mostly on the first few days, or during the last day or two, or at least during the final fortnight; however, in the southern plateau and middle and southern Rocky Mountain and Plains regions there was a marked cool period about and just before the middle of the month. In Nevada, interior California, and eastern Oregon it was warm for the season about the 15th to 18th, but to northward a few days earlier, while in Utah and Arizona and to eastward the marked warm period was about the 20th to 25th. The month averaged a little warmer than normal in most of California, Nevada, North Dakota, and Texas, and nearly everywhere along the Mexican border; but elsewhere it was a cool May, with marked deficiency, amounting to 3° or 4° a day on the average, in most of Idaho, western Montana, and eastern Washington.

During the first decade there was moderate precipitation in Montana and the States adjoining; during the next

fortnight there was moderate to ample, or occasionally heavy rainfall over most of Utah and nearly all parts of the Rocky Mountain and Plains States, save that hardly any occurred in North Dakota or Montana. The final week of May had less widely distributed rains, though parts of New Mexico, Wyoming, Montana, and especially the Dakotas and Nebraska received considerable. The monthly amounts were very large in the Black Hills region, being from two to three times the normal at many stations, and were fairly large in southern Montana, northern and eastern Wyoming, parts of Colorado, eastern New Mexico, northeastern Oregon, and western Washington. There was decidedly little rain in California, Nevada, or southern Oregon; and in the regions not previously mentioned the rain was mainly scanty and considerably less than normally comes in May.

### RETIREMENT OF GOVERNMENT EMPLOYEES.

The act of Congress, providing for the retirement of employees in the classified civil service of the United States, was approved by the President on May 22, 1920. Decisions under the act will be printed in the RECORD from time to time as issued.

Among the questions awaiting decision of the officials charged with the administration of the act is a definition of the term "classified," which will determine generally those individuals or groups of individuals to whom the provisions of the act shall apply. Furthermore, the act provides that "the President shall have power, in his discretion, to exclude from the operation of this act any employee or group of employees in the classified civil service whose tenure of office or employment is intermittent or of uncertain duration."

For the information of our employees the following brief statement of the provisions of the act is quoted from a circular issued by the Commissioner of Pensions:

Generally those who have reached the age of 70 years and rendered at least 15 years of service are eligible; mechanics, city and rural letter carriers, and post-office clerks are eligible at 65 years; railway postal clerks at 62 years of age.

The basis for annuity is length of service and a per cent of the average annual basic salary for the last 10 years of service. The classification and rates are as follows:

(A) Service, 30 years; annuity, 60 per cent of salary; maximum, \$720; minimum, \$360.

(B) Service, 27 years; annuity, 54 per cent of salary; maximum, \$648; minimum, \$324.

(C) Service, 24 years; annuity, 48 per cent of salary; maximum, \$576; minimum, \$288.

(D) Service, 21 years; annuity, 42 per cent of salary; maximum, \$504; minimum, \$252.

(E) Service, 18 years; annuity, 36 per cent of salary; maximum, \$432; minimum, \$216.

(F) Service, 15 years; annuity, 30 per cent of salary; maximum, \$360; minimum, \$180.

The term "basic salary" excludes "bonuses, allowances, overtime pay," etc.

Service is computed from date of original employment; includes periods of service at different times; includes service beyond seas; also in the Army, Navy, Marine Corps, or Coast Guard, but not if pension or compensation is allowed therefor.

Any employee to whom this act applies who shall have served for a total period of not less than 15 years, and who, before reaching the age of retirement, becomes totally disabled by reason of disease or injury not due to vicious habits, intemperance, or willful misconduct, may be retired.

No person may receive an annuity under this act and compensation under the act to provide compensation for employees suffering injuries covering the same period.

All employees to whom this act applies shall, upon the expiration of 90 days next succeeding its passage, if of retirement age, or thereafter on arriving at retirement age, be automatically separated from the service and all salary or compensation shall cease from that date. The head of each department, branch, or office shall notify such employees 60 days in advance thereof.

If within 60 days after the passage of this act or not less than 30 days before the arrival of an employee at age of retirement, the head of the department, branch, or office in which employed certifies to the Civil Service Commission that by reason of efficiency and willingness to remain in the service, continuance would be advantageous to the public service, the employee may be retained for successive terms of two years upon certification. At the end of 10 years no employee shall be thus continued for more than 4 years.

Beginning the first day of the third month next after the passage of this act and monthly thereafter there shall be withheld 2½ per cent from the basic salary of each employee.

The Secretary of the Treasury is authorized to supplement contributions of employees with donations, gifts, legacies, and bequests given for the benefit of civil-service employees generally or of any special class.

In cases of disability if annuity is discontinued before the annuitant has received a sum equal to the total amount of contributions with accrued interest, the difference shall be paid to the employee or estate.

On separation from service before reaching retiring age the total amount of deductions of salary with accrued interest at 4 per cent compounded shall, on application, be returned to the employee or to estate.

In case an annuitant shall die without having received in annuities an amount equal to the total amount deducted from his or her salary, with interest at 4 per cent compounded, the excess of accumulated deductions shall be paid to legal representatives.

Annuities shall be paid monthly and are not assignable or subject to execution or other legal process.



## MONTHLY PROGRESS REPORTS FOR MAY.

Monthly conditions of principal Reclamation Service reservoirs for May, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.....	Roosevelt <sup>3</sup> .....	41,305,000	2128	1903	1,391,100	1,372,740	1,392,800	125,536	2129.4	2128.32	2129.5
California, Orland.....	East Park.....	51,000	1199.68	1111.68	20,850	19,550	21,530	4,315	1178.45	1177.13	1179.32
Idaho:											
Boise.....	Arrowrock.....	280,000	3211	2956	123,400	278,600	278,600	245,788	3146	3211.7	3211.7
Minidoka.....	Deer Flat.....	177,000	2518	2488	173,734	138,836	173,734	63,536	2517.75	2513.75	2517.75
	Lake Walcott.....	95,180	4245	4236	93,900	100,730	104,340	948,220	4244.89	4245.46	4245.76
	Jackson Lake.....	847,000	6769	6730	185,300	356,060	356,060		6740.14	6748.33	6748.33
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	33,000	30,100	33,000	630	2213.8	2212.9	2213.8
St. Mary Storage.....	Sherburne.....	33,000	4765	4720							
Sun River.....	Willow Creek.....	16,700	4130	4085	5,199	12,113	12,113		4114.5	4125.2	4125.2
Nevada-Wyoming, North Platte.....	Pathfinder.....	1,070,000	5852	5670	501,030	1,016,590	1,016,590	42,080	5817.96	5849.6	5849.6
	Lake Alice.....	11,400	4182	4159	4,220	8,903	8,903		4170.8	4178.6	4178.6
	Lake Minatare.....	60,700	4125	4074	55,065	54,443	55,065		4122.3	4122.3	4122.3
Nevada, Newlands.....	Lake Tahoe.....	5 120,000	5 6230	6 4224					6225.32	6225.71	6225.71
	Lahontan.....	290,000	4162	4060	207,450	202,100	207,450	51,622	4154.5	4153.8	4154.5
New Mexico:											
Carlsbad.....	McMillan.....	45,000	3267.7	3241.6	21,000	40,000	40,000	16,000	3262.8	3266.9	3266.9
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4231.5	1,145,325	1,639,748	1,639,748	109,090	4359.15	4377.8	4377.8
Oregon, Umatilla.....	Cold Springs.....	50,000	621.5	560	48,950	48,350	49,850	5,389	620.79	620.42	621.4
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	312,000	301,000	312,000	1,144	4534.2	4533.7	4534.2
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	182,790	200,620	215,000	22,610	2972.3	2974.6	2976.6
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	180,000	232,000	232,000		7548.5	7555.5	7558
Washington:											
Okanogan.....	Conconully.....	13,000	2287	2232	2,126	2,700	2,900	730	2255	2258	2259
Yakima.....	Bumping Lake.....	34,000	3426	3389	26,865	30,895	34,235	3,400	3420.5	3423.8	3426.4
	Lake Clealum.....	22,800	2134	2122	24,130	24,920	30,690	5,770	2134	2134.3	2136.8
	Lake Kachess.....	210,000	2258	2192	187,210	213,275	213,275		2450.2	2456.2	2456.2
	Lake Keechelus.....	152,000	2515	2425	110,670	138,885	138,885		2497	2509.4	2509.4
Wyoming, Shoshone.....	Shoshone.....	456,600	5360	5132.3	268,404	361,560	361,560	43,463	5323.4	5344.6	5344.6

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> U. S. storage begins at elevation 6229.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—Water was run in all of the canals during May with the exception of the Grand Canal. The water was out of this canal from May 22 to 30 for cleaning purposes.

There were six maintenance crews in the field during the month and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 244; average head of stock, 78; miles main canals cleaned, 40; miles laterals cleaned, 148½; number of new structures installed, 24; number of old structures repaired, 83; Riprap placed, 1,720 feet; concrete placed, 68 cubic yards; dirt fill placed, 411 cubic yards; new ditches constructed, 3 miles; concrete pipe laid, 774 feet; corrugated pipe laid, 82 feet.

Good progress was made on the protective work on the left bank of the Arizona Canal below Granite Reef Dam and the work should be completed by the middle of June.

The apron at Granite Reef Dam has been gone over with a finish coat to smooth off the rough spots caused by floods.

The shortage of labor has become more acute and at present the maintenance of the project is being carried on under the greatest difficulty, not more than one-third the required number of men being available.

The Ruth excavator worked on the south bank of the Western Canal, west of Peterson Station part of the month, moving approximately 600 cubic yards of berm. This machine was brought to the yard and underwent a thor-

ough overhauling, after which it will move on to Lower Consolidated Canal.

The P. & H. ½-yard excavator is being operated on the east bank of the Eastern Canal near station 85. This machine moved 8,425 cubic yards during the month.

The Marion ¾-yard drag line is still laid up waiting repair parts.

*Operation of power system.*—The total power generated during the month was 7,625,350 K. W. H.

The Roosevelt power plant operated 98.8 per cent of the month. Water flowed over the spillways of the dam during the entire month. The Cross Cut power plant operated 99.3 per cent of the month; the South Consolidated, 94 per cent; the Arizona Falls, 95 per cent; and the Chandler plant, 94.3 per cent.

All the substations were available for service during the month.

All pumping plants were available for use when needed excepting Batteries 1, 2, and 4. These plants were shut down for about 3 days while the transformers were being cleaned and the oil filtered.

Work was done on the north sluice gate at the south end of Granite Reef Dam in order to make this gate operate without binding.

*Construction work, Roosevelt.*—The concrete flume under roadway at the storehouse was completed. Work on the roadway at the foot of the south spillway was continued.

Material and equipment were assembled and setup preparatory for work to start when possible on the cleaning out of the debris in the south spillway discharge below the dam.

Office.—The following acreages were entitled to irrigation water service on the 1st of the month:

	Acreage.	Number of applications.
Permanent.....	171,549.00	4,242
Normal flow.....	2,059.75	615
Temporary.....	18,803.26	103
Townships.....	3,973.75	6
Total.....	196,385.76	4,966

—W. R. Elliott.

*Prevailing crop prices at close of May, 1920.*

Project.	Alfalfa hay, per ton.		Barley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at shipping point.				
Salt River.....	\$16-\$20	\$24-\$28	\$1.50	\$1.08	\$2.10	\$6.00
Yuma.....	20.00	25.00				
Orland.....	20.00	25.00	1.50			
Grand Valley.....	35.00	40.00	1.60	1.40	2.55	4.20
Uncompahgre.....	20.00		1.50	1.20	2.50	3.00
Boise.....	26.00	35.00	1.50	1.40	2.10	6.00
King Hill.....	25.00	30.00		1.20		4.80
Minidoka.....			1.75	1.20	2.55	4.50
Huntley.....						
Milk River.....	40.00	45.00	1.27	.93	2.71	7.00
Sun River.....	30.00	36.00	1.24	.96	2.67	5.10
Lower Yellowstone.....	32.00		1.50	1.10	2.94	4.00
North Platte.....						
Newlands.....	22.00	28.00				6.00
Carlsbad.....		26.00				
Rio Grande.....		30.00				
North Dakota pumping.....						
Umatilla.....		35.00				
Klamath.....	25.00	35.00	1.40	.93	1.95	
Belle Fourche.....			2.00	1.15	2.90	6.60
Strawberry Valley.....		50.00	2.50	1.60	3.00	4.80
Okanogan.....	20.00					5.50
Yakima.....						
Sunnyside unit.....	32.00	37.00				4.80
Tieton unit.....	32.00	37.00				4.80
Shoshone.....	26.00		1.44		3.00	3.60
Blackfoot.....	30.00		1.25	.95	2.68	
Flathead.....		47.00			2.75	4.80
Fort Peck.....		35.00		1.12	2.70	7.20
Riverton.....						

YUMA PROJECT, ARIZONA-CALIFORNIA.

May weather conditions were favorable. Labor conditions were fair.

*Construction.*—On the East Drain Lateral of the Yuma Valley drainage the Bucyrus dragline moved 22,802 cubic yards of material from station 6 to station 20. One thousand two hundred cubic yards of material were moved in rebuilding a small lateral which was cut by the East Drain. In addition, a highway bridge and a flume for the Central Canal were built across the East Drain. Five minor wooden structures were built. One survey party is employed in making surveys on the first unit of Yuma Mesa auxiliary project.

*Operation and maintenance.*—Ten thousand acre-feet of water were delivered to approximately 20,000 acres. In

the Yuma Valley, Monighan drag line No. 1 cleaned 3,000 cubic yards of silt from Central Canal, station 60 to station 72. Monighan dragline No. 2 cleaned 11,500 cubic yards of silt from West Main Canal, station 903 to station 970. The V machine cleaned 19 miles of small laterals.

Six miles of small laterals were cleaned on the Yuma Indian reservation by the Ruth dredger.

The high river made it necessary to operate the quarry and rock trains; 24,124 cubic yards of rock riprap were placed on the Yuma Valley and reservation levees.

Chopping, cultivating, and irrigating cotton and cutting alfalfa hay were the chief occupations of the ranchers during the month.

The maximum discharge of the Colorado River during the month was 81,100 second-feet, minimum 15,800 second-feet, and mean 46,219 second-feet. The gage on May 31 was 25.1 and the discharge 81,100 second-feet. The discharge for the month was 2,842,000 acre-feet.

*Arizona cooperative work.*—The diamond drill party completed Alma dam site at the end of April and began moving to Red Rock site. At the end of May one hole was completed at Red Rock 78 feet to bedrock and 15 feet in rock. A second hole was drilled to 101 feet without striking rock. A survey party began Red Rock reservoir survey May 1 and completed the work at the end of the month. A railroad survey party began on the relocation of the railroad line, San Carlos reservoir, on May 17.

District Counsel R. J. Coffey visited the project on the 11th in the interest of the legal department. Statistician C. J. Blanchard and R. B. Dame, photographer, arrived on the 17th and spent several days taking still and moving pictures of the important features of the project.—W. W. Schlecht.

ORLAND PROJECT, CALIFORNIA.

May temperatures were high, and there was almost constant north wind, which at times was unusually severe. There was no rainfall, and at the close of the month the precipitation for the season was 10.53 inches short of the normal.

Cutting of the second crop of alfalfa, which as a whole is above the average yield, was in progress. This will be the last cutting for the season on most of the gravel land. The harvesting of grain was also in progress at the close of the month. On irrigated land the yield will be heavy, but on dry-farmed land it will probably not be more than 30 per cent in this locality and not more than 20 per cent of a crop for the State as a whole. Considerable milo was planted, but quite a proportion of the acreage on the Orland project will be a failure on account of indifferent preparation of the land and close planting, which will render effective tillage impossible.

There was a general movement of live stock to the city markets, the usual seasonal movement being augmented by the high price and prospective scarcity of feed. There was a drop in price for cattle of about \$2 and of hogs of \$1 per hundredweight. The price for butter fat also decreased 2½ cents per pound.

The supply for irrigation was supplemented throughout the whole month by draft on storage. Water deliveries amounted to about 5,000 acre-feet, and 14,000 acres were irrigated. Forty-nine miles of laterals were mowed out during the month and 1½ tons of grasshopper poison was mixed for water users by the maintenance force. Principally on account of high winds the concrete lining force was employed only 13 days on supplemental work, placing 4,993 square yards (229 cubic yards) of concrete.—A. N. Burch.



## GRAND VALLEY PROJECT, COLORADO.

May weather was warm and dry and conditions were favorable for construction work as well as for farming operations. Ample labor was available for drainage construction carried on from headquarters in town, but considerable difficulty was experienced in securing an adequate supply of labor for the maintenance work on the project.

Crop conditions at the end of the month were very favorable. The planting of spring crops was practically completed and grain, sugar beets, and potatoes were coming up nicely. The sugar-beet acreage was considerably increased over last season, about 3,000 acres being planted to this crop. In general, an excellent stand has been secured. Alfalfa, although held back on account of the late spring, made an excellent growth during May and the first cutting, which is nearly ready to harvest, will be well up to the average yield.

The irrigation system was operated without interruption throughout the month, supplying water to all farmers desiring to use it. Approximately 5,000 acre-feet were delivered to 12,000 acres on the project and 3,000 acre-feet for 8,500 acres in the Palisade and Mesa County irrigation districts. No particular difficulties were experienced in operating the system, and there were no interruptions in water deliveries except those due to occasional breaks in the laterals and washouts of drops. The maintenance force was engaged in repairing laterals, handling water deliveries, and installing weirs, turnouts, and other minor structures for supplying new lands.

On the drainage work two drag-line excavators were operated in the Grand Valley drainage district and one machine on the project. A second machine was moved to the project at the end of the month. One and one-tenth miles of open drain were completed, involving 32,000 cubic yards of excavation. The comparatively small output was due to the fact that one of the machines was laid up most of the month for overhauling and another consumed considerable time in moving to new work. Several culverts, flumes, and other minor structures were installed across the drains.

Among the official visitors on the project during the month were C. E. Piatt, examiner of accounts, C. A. Lyman, accountant in the Washington office, and Messrs. Ireland and Cline, of the Department of Agriculture.—*S. O. Harper.*

## UNCOMPAHGRE PROJECT, COLORADO.

May weather was favorable for farm and operation and maintenance work, except for a rainy period from the 11th to the 15th inclusive. The total precipitation of 1.66 inches fell on seven days.

Excellent progress was made by the farmers in plowing and seeding, and although they were delayed somewhat by the wet weather in April, the farm work is now caught up and the growth of vegetation normal. The rains from May 11 to 15 did considerable damage to beets by baking the soil.

About a normal acreage of crops was planted except for sugar beets, which was increased to probably 5,000 acres, and potatoes, which was reduced somewhat on account of the high price of seed.

There was a large demand for water throughout the month, except during the rainy periods. About 80 per cent of a head was carried in all canals except the South Canal. During the last half of the month the Uncompahgre River was in flood stage. It did no damage to canal headworks and comparatively little damage to farm lands.

Minor repairs were made on the South Canal lining on May 10 and 11 and again on May 28 and 29. The con-

crete lining was found to be in good shape except for a short section above Tunnel 1, about 20 feet of floor in Tunnel 2, and a portion of the floor below Tunnel 3. In each instance there had been additional bulging of the floor during the winter. On the canal and lateral system only the regular routine work was performed.

The snow on the watershed indicates that the run-off will be considerably above normal.—*Porter J. Preston.*

## BOISE PROJECT, IDAHO.

Unseasonable weather prevailed during May. Both the temperature and precipitation ranged below normal. North and west winds were prevalent which drew considerable moisture from the ground. Light frosts occurred at intervals during the month. This did some damage to tender vegetables but did not injure the fruit.

*Labor conditions.*—All available labor was fully employed; the supply was not equal to the demand. Highway work and farm operations furnished employment for a large number of men and teams. There was a general wage increase in all lines of work.

*Farming operations.*—On the farms corn and late potatoes were planted and the early potatoes cultivated. Grain fields, meadows, orchards, and pastures were irrigated. Due to the dry, windy weather the demand for water was heavy.

A large acreage has been planted to early potatoes and a good stand has been secured. Light frosts during the latter part of the month injured the potatoes in some sections but it is not believed the damage will be material.

A small area of alfalfa was cut for home consumption as the supply of all hay is exhausted.

*Water supply.*—The precipitation during the month was below normal by 0.73 of an inch. The deficiency for the year is 2.48 inches.

The cool weather retarded the melting of the snow in the mountains. The discharge of Boise River was about 58,000 acre-feet below the mean for the past 26 years. Arrowrock reservoir was filled and water began flowing over the spillway on the 24th.

*Operation and maintenance.*—The entire canal system was operated to full capacity. Several breaks occurred in the lateral system that resulted in a small crop damage. These breaks were repaired with only a slight interruption of the flow of water.

Small crews were engaged in repair to structures, protecting canal banks from erosion, and on general maintenance work.

*Construction.*—In the portion of the project now under public notice several tap boxes and weirs were installed to serve new lands. On the Notus Canal a small force was employed on the construction of bridges and on the suspended contract of William Long.

*Drainage.*—Both of the dragline excavators worked two shifts each on the drainage system under the Big Bend and Riverside irrigation districts. On the East Alkali Drain considerable flowing sand was encountered and resulted in a few small slides. One crew was engaged on the installation of structures at highway and canal crossings.

*Surveys.*—Miscellaneous surveys were made in connection with the construction, drainage, and operation and maintenance work.

*Visitors.*—Allen P. Joy, inspector for the Interior Department, visited the project May 7-9.—*J. B. Bond.*

## KING HILL PROJECT, IDAHO.

May weather was cold for this season of the year.

Camp 5 was closed down the first of the month, and no construction camps were in operation. Two engineering field parties were engaged on cross-section, profile, and

location surveys for structures to be built during the coming construction season. The engineering force was engaged on design of structures and preparation of bills of material for next season's work.

The management of the King Hill Irrigation District maintained a successful delivery of water during the month.

Allen P. Joy, inspector for the Interior Department, visited the project on the 11th, and J. L. Savage, designing engineer of the Denver office, on the 17th and 18th. H. R. McBirney, office engineer, who has been employed on the King Hill project for the past three years, left on the 27th for Boise to accept a temporary position with A. J. Wiley, consulting engineer.—*Walter Ward.*

#### MINIDOKA PROJECT, IDAHO.

The total precipitation on the project for May was 0.45 inch. The precipitation at Moran, the outlet of Jackson Lake, amounted to 1.25 inches from May 1 to 31.

On the South Side pumping unit delivery of water was carried on the entire month. Three regular maintenance crews, consisting of between four and five men, have been cleaning laterals, riprapping laterals and structures, strengthening canal banks, repairing and replacing structures, and destroying burrowing animals. In addition to the above crews, a small ditch-cleaning crew was employed most of the month on cleaning blow sand out of the B-1 lateral; approximately 2,300 cubic yards of sand were moved.

The office work in connection with the reclassification of the irrigable acreage on the gravity unit continued throughout the month. A topographic party of five men worked at American Falls all the month making subdivision surveys for rights of way, and taking topography on 840 acres.

C. J. Blanchard, statistician, visited the project on the 8th, and C. A. Lyman, chief of repayment section, on May 10 to 15, inclusive.

The discharge at Howells Ferry amounted to 849,220 acre-feet as compared with 292,042 acre-feet for April. The total diversions to the project amounted to 128,790 acre-feet, being 83,490 acre-feet to the North Side gravity and 45,300 acre-feet to the South Side gravity, of which 36,435 acre-feet were pumped to the South Side pumping unit. The maximum amount of water during the month in the North Side gravity canal was 1,496 second-feet; in the South Side gravity canal there were 924 second-feet, and 770 second-feet pumped at the South Side pumping stations.—*Barry Dibble.*

#### HUNTLEY PROJECT, MONTANA.

May weather conditions were satisfactory for field operations and with the labor supply about normal nearly all the proposed maintenance work was completed by the end of the month.

One crew was engaged practically full time in replacing small structures, turnouts, checks, etc., and in completing the check in the main canal at Lateral F. G. L.

Water was turned into the main canal on the 27th, and one unit of the hydraulic pumping plant was started on the 28th. There was, however, only a slight demand for water during the remainder of the month.

The general crop conditions throughout the project are excellent. Early beets are being thinned and the first cutting of alfalfa will be ready about June 10.

*Drainage.*—On May 11 the water users of the second unit met with the project manager at Pompeys Pillar and approved a plan for making the necessary seepage investigations in that district. On the 17th work was resumed on

#### Crop report, King Hill project, Idaho,<sup>1</sup> year of 1919.

Crop.	Area. (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	2,861	Ton.....	10,263	3.6	17.59	180,574	63.12
Alfalfa seed.....	31	Bushel.....	87	2.8	17.30	1,500	48.39
Apples.....	293	Pound.....	18,100	61.8	.045	809	2.76
Barley.....	16	Bushel.....	290	18.1	1.74	503	31.44
Clover hay.....	12	Ton.....	6	.5	16.00	96	8.00
Corn, Indian.....	81	Bushel.....	1,664	20.5	1.73	2,876	35.51
Corn, fodder.....	47	Ton.....	118	2.5	4.91	580	12.34
Fruits, small.....	3	Pound.....	5,460	1829.0	.05	273	91.00
Garden.....	50					2,835	56.75
Hay.....	13	Ton.....	10	.77	17.50	175	13.46
Oats.....	54	Bushel.....	2,865	53.1	1.04	2,977	55.13
Pasture.....	426					4,755	11.16
Peaches.....	78	Pound.....	58,850	754.5	.039	2,274	29.15
Pears.....	21	do.....	2,000	95.2	.06	120	5.71
Potatoes, white.....	84	Bushel.....	6,386	76.0	1.85	11,812	140.62
Potatoes, sweet.....	1	do.....	40	40.0	1.50	60	60.00
Prunes.....	6	Pound.....					
Rye.....	8	Bushel.....	160	20.0	1.38	220	27.40
Wheat.....	196	do.....	3,182	16.2	2.04	6,501	33.20
Miscellaneous.....	6					306	51.00
Less duplicated areas.....	328						
Cropped.....	3,959		Total and average.....			219,246	55.39
Nonbearing orchard.....	338						
Young alfalfa.....	339						
Fall plowed.....	248						
Miscellaneous.....	109						
Other purposes.....	1,034						
Total irrigated.....	4,993						
			Areas.		Acres.	Farms.	Per cent of project.
			Irrigable area farms reported.....		7,719	108	47.2
			Irrigated area farms reported.....		4,993	108	30.5
			Cropped area farms reported.....		3,959	108	24.3

<sup>1</sup> Data furnished mainly by King Hill Irrigation District. System was built under private auspices. The United States has undertaken its reconstruction. Operation and maintenance are handled by the district.



Tile Drain No. 30, and this drain was completed on the 27th except back filling.

Visitors.—Examiner of Accounts F. G. Hough visited the project on the 8th. John N. Edy, State highway engineer, called at the project office on the 8th in connection with the construction of culverts and bridges over laterals on the proposed hard-surfaced roads between Billings and Ballantine.—*Wm. M. Green.*

*Project weather during May, 1920.*

Project.	Station.	Temperature, °F.			Precipitation (inches).
		Maximum.	Minimum.	Mean.	
Salt River.....	Phoenix, Ariz.....	105	50	75.8	0.42
Yuma.....	Yuma, Ariz.....	107	50	77.6	.....
Orland.....	Orland, Calif.....	103	42	69.5	.....
Grand Valley.....	Grand Junction, Colo.....	88	40	62	.80
Uncompahgre.....	Montrose, Colo.....	86	35	58	1.66
Boise.....	Boise, Idaho.....	81	32	68.4	.56
King Hill.....	Glenns Ferry, Idaho.....	88	26	52.3	.05
Minidoka.....	Burley, Idaho.....	84	27	54.2	.45
Huntley.....	Ballantine.....	86	30	55	1.79
Milk River.....	Malta, Mont.....	88	33	56.3	.94
St. Mary storage.....	Near Babb, Mont.....	68	24	45	2.20
Sun River.....	Fort Shaw, Mont.....	79	27	49.8	.93
Lower Yellowstone.....	Savage, Mont.....	88	32	56.6	1.39
North Platte.....	Wynote, Wyo.....	86	31	54.6	4.88
Newlands.....	Fallon, Nev.....	87	28	57.8	.16
Carlsbad.....	Carlsbad, N. Mex.....	99	45	.....	2.61
Rio Grande.....	El Paso, Tex.....	95	52	73	.....
North Dakota pumping.....	Williston, N. Dak.....	84	33	54.3	2.03
Umatilla.....	Hermiston, Oreg.....	87	30	57	.08
Klamath.....	Klamath Falls, Oreg.....	80	23	51.6	.33
Belle Fourche.....	Orman, S. Dak.....	89	36	58	6.84
Strawberry Valley.....	Provo, Utah.....	85	30	56	3.87
Okanogan.....	Omak, Wash.....	85	29	55.7	T.
Yakima.....	.....	.....	.....	.....	.....
Sunnyside unit.....	Sunnyside, Wash.....	88	31	55.8	.11
Tieton unit.....	Cowiche, Wash.....	78	31	52.8	.26
Shoshone.....	Powell, Wyo.....	80	25	51.0	.33
Indian projects:	.....	.....	.....	.....	.....
Blackfoot.....	Browning, Mont.....	67	26	42	1.07
Flathead.....	St. Ignatius, Mont.....	76	26	48.9	2.78
Fort Peck.....	Poplar, Mont.....	90	34	57.7	1.55
Riverton.....	Pavilion, Wyo.....	83	28	52.6	1.67

*MILK RIVER PROJECT, MONTANA.*

May weather conditions although cold and windy were fairly favorable for construction and farming operations. The precipitation, however, was more than an inch below normal and crops as a whole are backward. Considerable alfalfa was winter-killed and some damage is reported from cut worms, both on the irrigated and adjacent dry-land areas. Labor was unusually scarce, but showed a tendency to improve toward the end of the month.

The Dodson North Canal was operated throughout the month and the other canals in the latter portion of the month for delivery of water to farmers. Owing to the windy weather an unusual amount of trouble from weeds has occurred. The demand for water was quite heavy toward the end of the month.

Maintenance work consisted mainly of burning weeds, minor repairs to washouts, miscellaneous riprap and brush revetment, painting flumes, and some small repairs to structures.

Construction was resumed late in the month by the contractors on lateral extensions on the Saco unit. The contractor for wastewater ditch WD-10-8-1 on the Dodson north unit completed his work on the 30th. A multiple-bay timber check was built on the Dodson South Canal at mile 12; also two checks of the same type at miles 11 and 14 on the Bowdoin Canal and one at mile 11 on the

Vandalia South Canal. On the Nelson Reservoir South Canal work on miscellaneous minor structures was continued with a small force. A fence was erected around the Saco operation and maintenance headquarters and trees planted.

C. C. Wright of the office of demonstrations on reclamation projects, Department of Agriculture, was assigned to the project for assistance to the irrigators.

Official visitors included Chas. P. Williams, assistant chief engineer, and Miss Jeanette Rankin, former Member of Congress from Montana.—*H. A. Parker.*

*ST. MARY STORAGE UNIT.*

The spring was backward and the weather during May was cold, stormy, and unsettled.

The second barrel of Spider Coulee flume was completed. Work was started on rebuilding banks between Kennedy and Powell Creeks, and two rock-filled log cribs were placed in Swift Current Creek to prevent cutting of the diversion dike.

Water was turned into St. Mary Canal the morning of the 25th, and the first water was delivered to Milk River during the night of the 26th; 4,515 acre-feet were diverted from St. Mary River and 2,548 acre-feet were delivered to Milk River.

The amount of snow in the mountains in the St. Mary and Swift Current drainage basins indicates that there will be a good flow during the summer.—*R. M. Snell.*

*SUN RIVER PROJECT, MONTANA.*

May weather was in general unfavorable with cold windy days predominating. Farm work has been delayed. Planting of wheat was continued until the latter part of the month after which seeding of flax and oats began. A large acreage of grain is in and prospects are bright for a good crop although some loss has been occasioned from wire and cut worms. Prices of farm produce are considerable lower than at the end of April.

Work was started and fair progress made by the three contractors having small earthwork contracts on the Greenfields division. About 300 linear feet of concrete floor were poured in the Greenfields Canal in Big Coulee.

Maintenance work on the Fort Shaw division was continued. The first water was turned into the Fort Shaw main canal on the 28th and one delivery for irrigation water made on the 31st. On the Greenfields division work was begun in clearing out dirt which had blown into some of the laterals from adjoining farms. Water was turned into the Pishkun Canal on the 28th, and had reached Pishkun reservoir and started down the Sun River Slope Canal by the end of the month. It is expected to start delivery of water on Greenfields division about June 7.—*Geo. O. Sanford.*

*LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.*

May weather was favorable for spring farm work and at the close of the month nearly all spring seeding had been completed. A few fields of alfalfa that winter killed will be plowed up and seeded to oats, flax, or corn. The precipitation amounted to 1.39 inches, which was 56 per cent of normal for May. There was sufficient moisture, however, for seed germination and crop growth was satisfactory. The temperature was 3° above normal and, although the nights were cool, there was only one frost during the month.

The Parsons dragline excavator was in operation continuously during the month removing silt and material washed into the canal prism through the Bell Hill sec-

tion; 0.9 mile of this canal section was placed at its normal capacity. Dragline No. 2 completed reinforcing the lower canal bank below Thomas Point. Owing to the late spring it was not possible to carry out the original plan of cleaning the silt from the canal prism through this section of canal where the bank is being reinforced before turning water into the canal. Owing to the scarcity of help it was not possible to operate dragline No. 1. The reach of canal bank at Indian Coulee that has been very unstable during the past two operating seasons, which was removed last December with dragline excavator No. 1, was rebuilt by placing selected material of screened gravel in this embankment. All the available help that could be secured, including teamsters with teams, were busily engaged the entire month burning weeds, removing brush from the upper reach of the main canal, cleaning silt from laterals, replacing wooden structures, and placing drains in the canal bank at Ash Coulee, where heavy seepage occurred last season. The amount of maintenance work that should be accomplished to place the distributary system in perfect condition is unusually heavy and only the more important, or worst places, will be repaired due to the late spring and scarcity of help.

No water deliveries were made during the month, although water was turned into the main canal on May 17 for sluicing weeds, brush, and other debris from the canal prism. As the dry lands adjacent to the project yielded an unusually heavy crop of tumble weeds during the season of 1919, the main canal and other comparatively large canals of the project contained large amounts of these troublesome weeds. On the 29th a weed jam occurred at the check above Bell Hill, which made it necessary to turn the water out of the main canal at the Savage sluiceway for 36 hours. This weed jam was some 4 feet thick, extended up the canal about 150 feet, and required nearly 15 man-days to remove it.

The decree establishing Lower Yellowstone Irrigation District No. 1 has been signed by Judge Hurley and five commissioners have been appointed. The hearing before the county commissioners of McKenzie County, N. Dak., in connection with the petition filed in the matter of formation of Lower Yellowstone Irrigation District No. 2, was held on May 18. The commissioners, after thoroughly and intelligently considering the matter, passed the necessary resolutions establishing the boundaries of the district and the divisions thereof. The special election to be held in connection with this district was called for June 19. Only the routine procedures prescribed by law remain to be carried out to make irrigation district No. 2 a going concern, as it is assumed from the general opinion prevailing that very few, if any, of the water users in North Dakota are opposed to the formation of the irrigation district.—*L. H. Mitchell.*

#### NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

The weather for the first half of May was generally cloudy and rainy and unfavorable for farm and construction operations, but was fair and warmer during the last of the month.

*Operation.*—The storage at the Pathfinder Reservoir on the 1st of May was 501,030 acre-feet and soon after the inflow began to increase so rapidly that it was evident that the reservoir would be filled and overflowing before the flood period had passed. On the 28th the south tunnel valves were opened and the full discharge of 5,410 second-feet was permitted to waste in order to delay the date of overflowing. At the end of the month the storage was 1,016,590 acre-feet, or more than double that of the first. The maximum inflow was 14,480 second-feet on the 29th. The total inflow was the largest ever recorded for May, being 562,940

acre-feet, as compared with 450,950 acre-feet in 1909 and 447,090 acre-feet in 1917, the two previous years of heavy run-off. The unusually heavy early run-off was due to the heavy rains in April, which the United States Weather Bureau and Forest Service reports state "probably has never been exceeded by any other April."

Water was diverted into the Interstate Canal on the 22d. The diversion of 240 second-feet was gradually increased to 1,150 second-feet on the 31st. The first delivery for irrigation purposes was made on the 27th. There was very little demand for water on account of the late season and the large amount of moisture in the ground.

No water was delivered for irrigation purposes on the Fort Laramie unit and the canal was operated as far as mile 25.5 to furnish water to the Lingle power plant. On the 27th 20 second-feet were permitted to pass this point for seasoning purposes, and this amount had been increased to 60 second-feet at the end of the month.

*Maintenance.*—On the Interstate unit it was necessary to employ large forces in the regular ditch cleaning and maintenance work in order to be ready for operation. An average force of 149 men and 43 teams was employed on this work. Monaghan dragline No. 4 continued work of enlarging the capacity of the Interstate Canal in the vicinity of Rawhide Creek. During the month the machine enlarged 6,055 linear feet of canal, requiring the excavating of 19,444 cubic yards of material.

*Crops.*—The spring planting was greatly delayed on account of the late season. At the close of the month about 90 per cent of the sugar beets and grain had been planted and 50 per cent of the potatoes and corn. This work progressed rapidly during the fine weather the latter part of the month.

*Live stock.*—Practically all fattened stock has now been shipped to market and the rest taken to the ranges.

*Drainage.*—On the Interstate unit work was continued on the Lower Nine Mile outlet drain, but progress was slow on account of the unfavorable working conditions. Considerable difficulty is being encountered in the construction of the siphon to carry the Bayard drain under the Lower Nine Mile drain on account of the water and caving ground. Dragline No. 2 completed the cleaning of the silt from the Bayard Canal, and moved back to clean silt from the Lower Nine Mile drain: 12,990 cubic yards of silt were removed from the canal and 5,100 cubic yards from the drain. Dragline No. 3 completed the work for the Mitchell drainage district and was moved 10 miles to begin on the Dunham-Andrews drain, arriving there on the 20th, but was unable to start work on account of right-of-way complications.

On the Fort Laramie unit repairs to electric dragline No. 2 were completed on the 5th and work was resumed on the excavation of the Cherry Creek drain. During the working period, 26,141 cubic yards of material were excavated and 0.49 mile of drain was completed. The temporary flume to carry the Rock Ranch Canal over the Cherry Creek drain was completed.

*Construction.*—Storage unit: Work was continued on the construction of the concrete plug in the north tunnel at the Pathfinder Dam until the 28th, when it was necessary to stop on account of the backwater from the south tunnel discharge filling the tunnel. Work was then started on the canyon wall for the new outlet tunnel. Progress was slow on account of the difficult nature of the work and the heavy spray from the south tunnel discharge.

Interstate unit: Progress on the construction of the five-room house at Mitchell, Nebr., for the use of the district counsel was delayed on account of slow delivery of mill-work material.

Fort Laramie unit: Electric drag line No. 1 continued work on the lower end of the Springer lateral, operating with two shifts daily. During the month this machine



moved 21,760 cubic yards of class 1 material and 3,135 cubic yards of class 2, and completed 1.53 miles of lateral excavation. Drag line No. 3 continued work on the Fort Laramie Canal operations with two shifts daily. This machine moved 34,260 cubic yards of class 1 material and 2,067 cubic yards of class 2, completing 0.54 mile of canal. Drag line No. 4 was moved to the lower end of the Horse Creek lateral and started work on the 18th, operating with one shift daily until the 24th, when a second shift was added. During the working period this machine moved 11,859 cubic yards of class 1 and 464 cubic yards of class 2. Drag line No. 5 was operated with two shifts daily on the Horse Creek lateral, moving 38,765 cubic yards of class 1 and 1,450 cubic yards of class 2.

During the month the powder crew, averaging five men, drilled 1,620 linear feet of holes and used 80 pounds of dynamite and 3,180 pounds of TNT in blasting classified material ahead of the drag lines.

Work was continued on the construction of the check at mile 45.1 of the Fort Laramie Canal and on the construction of the structures on the Cherry Creek lateral system. The 6-foot cast-iron gate was installed at the intake of Cherry Creek lateral siphon No. 1, seven concrete collars were built around the barrel, and 1,500 cubic yards of backfill placed. Twenty-two minor structures were constructed and the excavation of 23 more was completed.

Northport unit: The excavation of the Northport Canal between stations 0 and 130 was completed on the 22d. This portion of the canal follows the Tri-State Canal and is an enlargement and reconstruction of that canal. The completion of this portion will permit the operation of the Tri-State Canal without further interference. The remainder of the excavation with the exception of the fills and overhaul will be constructed by electric drag lines. Work was continued on the construction of the permanent camp at Indian Creek.

*Power plant operation.*—The Lingle power plant was operated continuously throughout the month with three shifts daily. Construction work was started on the branch transmission lines to furnish power to the village of Morrill and the city of Mitchell.

*Surveys.*—Interstate unit: The drainage field party was employed on the survey for the additional construction work on the Lower Nine Mile drain and on surveys on the Dunham-Andrew and Pickering drains. The operation and maintenance party was employed on miscellaneous lateral location surveys, irrigable area investigations, and hydrographic work.

Fort Laramie unit: One field party at Cherry Creek camp was engaged in staking miscellaneous structures and furnishing line and grade for drag line No. 2. One field party at Fairview camp was engaged on miscellaneous lateral surveys and furnishing line and grades for drag lines Nos. 1 and 5. One field party at Kiowa camp was engaged in making a resurvey of the Fort Laramie Canal west of the Nebraska-Wyoming State line and furnishing line and grades for drag lines Nos. 3 and 4.

Northport unit: One party was engaged on miscellaneous work in connection with the construction of the Northport Canal and structures.—*H. C. Stetson.*

#### NEWLANDS PROJECT, NEVADA.

May weather was favorable for project work and crop growth.

Early in the month I. Wilkamsky, Director of the Agricultural Department of the Zionist Organization, accompanied by I. Gutmann, consulting engineer, visited the project in the course of their study of agricultural and irrigation practices in the West.

District Counsel E. W. Burr visited the project from May 5 to 8 on legal matters.

On May 13, Edson F. Adams, representative of the Canyon Power Co., and L. H. Taylor, consulting engineer for that company, conferred with the project manager in Fallon regarding power matters.

On May 17, the project manager attended a meeting of the board of directors of the irrigation district for the discussion of matters relating to drainage construction.

On May 18, Allen C. Joy, inspector, from the office of the Secretary, returned to Fallon investigating project conditions until the 29th.

On May 25, Mr. Wilcox, writer for The Country Gentleman, visited the project to collect material for his publication.

On May 28 and 29, Gunner J. Cozeus, one of 80 selected Australian veterans of the Great War who have been studying irrigation and agriculture for several months at the University Farm at Davis, Calif., visited the project for the continuation of his observations.

*Construction.*—On May 3 bids were opened for the construction of the Gault and Brown Laterals involving about 14,785 cubic yards of earthwork. Five bids were received. Four schedules on Gault Lateral were awarded to Meister Bros. at 17 cents per cubic yard, and one schedule on Brown Lateral was awarded to C. H. Hancock at 15 cents per cubic yard. At the end of the month schedules I and II, Gault Lateral, were practically completed. The Brown Lateral was completed on May 26.

Other laterals completed during the month were as follows:

Lawrenz Lateral, P. P. Schafer, contractor, completed May 11.

Bell Lateral extension, E. Raker, contractor, completed May 30.

Tucker Lateral, schedule I, T. V. Conner, contractor, completed May 30.

Tucker Lateral, schedule II, Ed. Humphrey, contractor, completed May 20.

Tucker Lateral, schedules III and IV, and the Harding Lateral were about 90 per cent completed at the end of the month by contractor J. A. Wood.

The following work by Government forces was accomplished during the month:

Reconstruction of F<sub>3</sub> and F<sub>4</sub> Laterals over a length of about 3½ miles.

Construction of Fleming, Browder, Teel, Wadsworth, and UK extension laterals, total length about 1 mile.

Minor structures installed in the lateral system consisted of 17 turnouts, 9 checks, 7 drops, 2 culverts, and 3 miscellaneous structures, a total of 38 minor timber (redwood) structures.

Rebuilding of the old needle check structure at station 849 in the Truckee Canal was completed. Installation of new timber turnout structure at station 1300, Truckee Canal, for the KF Lateral was also completed.

The project shops were operated for dragline, tractor, and miscellaneous equipment repairs.

Shopwork on metal parts for Lahontan temporary spillway crests was nearly finished.

Surveys were made as required in connection with the construction work in progress or contemplated.

Four of the five tractors owned by the Service were rented by private interests for land leveling.

*Settlement.*—Numerous prospective settlers made inquiry concerning project lands. During May, 5 homestead filings, covering 380 acres of irrigable land, and 6 water-right applications, covering 300 acres, were accepted. Only a few public land units remain unentered on the plats.

*Water supply and use.*—Storage in Lahontan Reservoir showed a net decrease of 3,710 acre-feet during the month, which was small considering the drafts being made for irrigation. At the end of the month storage in this reservoir amounted to about 202,100 acre-feet. No storage was secured in Lake Tahoe.

*Operation and maintenance.*—Irrigation service continued during the month without interruption, except on the Truckee Canal, which was not operated for a 3-day period in order to permit work on check structures.

A few minor breaks in small laterals occurred but caused but slight damage.

Only a small amount of maintenance work was done using teams, 2 miles of laterals in the V district, 3 miles in the T district, and three-fourths of a mile in the Truckee district being cleaned.

Dragline excavator No. 2 cleaned the L canal for a distance of 1,150 feet and the LD lateral over a length of 532 feet.

Dragline excavator No. 3 enlarged the upper end of the LB lateral over a length of 3,925 feet.

Cleaning and deepening of the J,B drain in the Carson Lake tract was completed between stations 115 and 122, a culvert being installed under the AA lateral at the latter station. Work of cleaning the L drain commenced and was completed between stations 108+10 and 132.

Eight timber structures, comprising 5 culverts, 2 checks, and 1 bridge chargeable to maintenance, were installed during the month.

The Carson Lake pasture was operated for the pasturage of 1,436 head of stock during May.—*John F. Richardson.*

#### CARLSBAD PROJECT, NEW MEXICO.

The weather was fair and warm during the first week of May and the planting of cotton was in progress; during the several days immediately following this date, there were local showers, accompanied in some parts of the project by hailstorms. There were showers at intervals throughout the month, and the growth of cotton and alfalfa was very satisfactory.

*Operation and maintenance.*—The demand for water was heavy until the 14th of the month, when local showers provided enough moisture for all crops. Water was out of the canal from the 14th to the 23d, inclusive. Very little water was used for irrigation during the remainder of the month. The average diversion in the main canal until the 14th, was about 800 acre-feet per day; after the 23d, about 160 acre-feet per day was diverted into the canal. Most of this water was wasted at the lower end of the canal. Lake Avalon was full and water passing over the spillways after the 20th. One maintenance crew was employed during the entire month cleaning open drains D and E, which were badly overgrown with tules and salt cedars, as well as moss. The regular maintenance crew was employed in building and repairing small structures when the weather permitted.

The total run-off for the month of the Pecos River at the Dayton station amounted to 46,300 acre-feet. The daily average was 1,490 acre-feet. The minimum flow of the Pecos River was 160 second-feet at the first part of the month, and the maximum of 1,660 occurred about the middle of the month. The increased flow above normal began on the 11th. The surplus water was largely supplied by melting snow on the upper watershed.

The planting of cotton was in progress during the entire month. The normal planting season usually begins about April 10 and ends about May 20. This season, owing to damage occasioned by hailstorms and the packing of the top soil by driving rains, considerable replanting was necessary; practically all of the fields needing replanting, however, were planted and for the most part the cotton

was up to a good stand at the end of the month. The stands of cotton generally at the end of the month were reported to be about average. On the lower end of the project in the Loving and Malaga districts, a relatively smaller proportion of the crop was replanted on account of small rainfall. The first cutting of alfalfa hay was rather late. The harvesting of this crop was in full swing at the end of the month, with some damage reported due to showers. The crop will be heavy and the prevailing price for good hay ranged from \$20 at the beginning of the cutting season to about \$26 at the end of the month. There were more hay buyers on the project than usual. The shipment of alfalfa hay was in progress at the end of the month. The growers were finding it difficult to get enough cars.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO—TEXAS.

May weather was favorable to plant growth. The first cutting of hay was being harvested but the yield will be light due to the late spring. The grain crop promises a good yield. It is estimated that 1,800 cars of cantaloupe and 100 cars of cabbage will be shipped from the Mesilla Valley during this season. Cotton is still being planted.

The inflow into the reservoir ranged from 1,760 second-feet on the 1st to approximately 22,500 second-feet on the 31st, making a gain in storage of about 494,423 acre-feet for the month. This is due to the fact that discharge of the Rio Grande from the upper drainage area has been considerably above normal. With a continuance of the present inflow it is likely that the reservoir can be filled during this season. This, however, will afford opportunity for releasing the water during the nonirrigation season to provide room for additional storage in the reservoir and to scour the river bed through the project and remove in this way accumulations of sand at diversion dams and restore an open river channel.

The outflow has been largely due to the fact that cotton is being irrigated for the second time.

A new wasteway was constructed at the end of the West Side Canal, as the old one at the head of the La Union ditch had washed out. Two thousand five hundred feet of brush rip rap was placed in the ditches of the Mesilla Valley. Eleven miles of drains in the El Paso Valley were cleaned of weeds. A new device for cutting Johnson grass along canal banks is being tried out.

On May 26, C. J. Blanchard, statistician, arrived on the project for the purpose of securing motion pictures of various locations throughout the project which show the progress of the irrigation and drainage works. Later in the season Mr. Blanchard will return to make up films of the same areas in harvest time. These pictures are exhibited in all parts of the United States in connection with lectures delivered, spreading the news of the work accomplished by the Reclamation Service.

On May 10 and 11 the project manager attended the annual convention of the American Association of Engineers, held at St. Louis, Mo.

Construction work for the month progressed principally on the drainage system. One dragline worked one shift on lateral construction on the island, excavating 21,768 cubic yards. The one T Monaghan operating two shifts on the Garfield drain excavated 25,000 cubic yards. The five Government excavators in the Mesilla Valley, working one shift each, excavated a total of 109,400 cubic yards. The contractor finished the second schedule of the Leasburg drain, completing the drain. In the El Paso Valley the middle drain was completed and the Playa begun. Total machine excavation on the project for the month was 210,100 cubic yards. A total of 170 miles of deep open drains have been constructed to date.—*L. M. Lanson.*



## NORTH DAKOTA PUMPING PROJECT.

May weather was fairly good for the kind of work in hand, although somewhat too cold and wet for crops. Precipitation amounted to 2.03 inches which was 0.23 inch less than normal and makes a surplus of precipitation to date this year 0.88 inches.

Labor conditions were more difficult than last year with a very large labor turnover. Labor is scarce, indifferent, and inefficient, and wages are the highest in the history of this locality.

An accumulation of water in the coal-mine made unwatering so expensive that a small electric-driven pumping equipment was ordered. A hole was drilled from the surface to the water body in the coal seam and the pumping equipment should be installed early in June. The mine is in good condition for the irrigation demands.

Four hundred feet of small flume and about 2 miles of small laterals were constructed to lands heretofore unirrigated. Necessary repairs were made to the barge which was launched May 22. The pumping stations were overhauled and everything made ready for water orders. The first water was pumped into the canals May 29. On account of the backward crops, due to the late, cold season, the irrigation district board decided to postpone the opening of the irrigation season to June 7.

The power plant was operated for the commercial power contract; 80,694 kilowatt-hours of electrical energy was delivered to the city of Williston which represented an increase of 8,354 kilowatt-hours over last month and an increase of 5,771 kilowatt-hours over the same month of last year.—*Wm. S. Arthur.*

## UMATILLA PROJECT, OREGON.

May was cold and backward, with temperature and rainfall considerably below normal. Precipitation for the month was 0.08 inch, as against an average for this month for the previous 11 years of 0.71 inch.

*Farming operations.*—Farming operations were confined almost entirely to seeding new crops and irrigation. There were no carload shipments of any kind during the month, due to the fact that the local supply on the project for export has been exhausted. A little over 4 tons of honey were shipped, and a number of less than carload shipments.

*Labor conditions.*—With the completion of the construction work on canal A for the season, the supply of labor for the maintenance and pipe manufacturing was adequate. A very serious shortage is faced by the farmers when haying begins shortly.

*Operation and maintenance.*—The feed canal A operated throughout the month, diverting from 56 to 300 second-feet. From 25 to 30 second-feet were delivered to the Echo Mills continuously throughout the month. From the 1st to the 16th, inclusive, water was delivered to the distribution system through the by-pass. On the 17th, betterments to canal A were completed, and direct diversion from the reservoir was begun. On May 21 the Furnish Ditch Co. had another break in Stage Gulch, the water from which reached the feed canal over spillway No. 2. By prompt regulation no damage resulted to the feed canal. From 161 to 207 second-feet were delivered continuously throughout the month to canal A. From 80 to 109 second-feet were diverted from the river by the Maxwell Canal continuously throughout the month. Approximately 100 second-feet were diverted by the West Extension main canal continuously.

The demand for water throughout the month was very heavy. On the east side this was due particularly to the delay in completing the betterments to canal A. Some crop loss was sustained but it was not possible at the end of the month to ascertain how serious these losses are.

From one to two crews were employed intermittently on maintenance work. Repairs to structures, cleaning of laterals, and brushing of banks made up the greater part of the month's maintenance activities. Sluicing operations were discontinued on May 27. Seepage conditions below spillway No. 5, together with the demand for water for irrigation, necessitated the discontinuance of the operation of the templets.

At the close of the month the Umatilla River was falling steadily, with the prospect that operations of the feed canal would be shortly discontinued except for the Echo Mills diversion. An excellent head of water will probably be available for the Maxwell Canal throughout the month of June. Water supply conditions for the west extension are problematical, although at the close of the month an adequate head was available. The institution of the rotation method of water deliveries will be made on about June 15. After this system has been successfully started there will undoubtedly be an adequate supply of water. At the close of the month the amount of water stored in Cold Springs reservoir was the largest at this date in several years.

*Construction.*—Enlargements and betterments to canal A: During the month of May all work contemplated for the present fiscal year was completed. About 50 cubic yards of reinforced lining were placed and the extension of the rectangular open conduit at the outlet of Cold Springs reservoir was completed, the latter involving the placing of about 90 cubic yards of concrete.

*Supplemental construction.*—District No. 29: 200 lineal feet of 16-inch concrete pipe were laid and two minor structures installed. District No. 30: 485 lineal feet of 20-inch concrete pipe were laid and two minor structures installed. Pipe manufactured: 110 20-inch concrete pipe, 211 12-inch concrete pipe.

*Visitors.*—On May 8, W. C. Hammatt, a civil and consulting engineer of San Francisco, visited the project. He was much interested in the Three-Mile Falls and Cold Springs dams. On May 15 and 16, D. W. Hays, formerly employed by the U. S. Reclamation Service on the Newlands project and now associated as manager with the Canadian Northwest Irrigation Co., visited the project. C. A. Lyman, chief of the repayment division, made an inspection of the project May 17 to 19.—*H. M. Schilling.*

## KLAMATH PROJECT, OREGON-CALIFORNIA.

May was favorable for all outdoor work. Practically all of the seeding and plowing has been completed. The early part of the month was generally favorable for the growing of crops; the latter part was cold and windy. A heavy frost on the 25th killed the garden vegetables and early potatoes and retarded the growth of alfalfa. Grasshoppers were beginning to hatch in large numbers at several places on the project, principally on the lands adjoining Tule Lake; also on some of the marsh lands adjoining the Upper Klamath Lake. Prompt measures were being taken by the county agricultural agent and the farmers to combat the pest.

Labor conditions were acute, men and teams being hard to secure. Wages were \$4.50 to \$5 per day for common labor.

One survey crew, consisting of an assistant engineer and three men, was employed on miscellaneous work in connection with the project proper and on surveys in connection with studies and project extensions.

Four small crews were engaged in repairing and replacing old and worn-out structures. Water deliveries were begun on the 1st of the month; by the 20th most of the project canals were being operated at full capacity, which condition continued throughout the month, the demand for water being the greatest in the history of the project.

During the month 25,947 acre-feet of water were diverted, of which about half was delivered to the farms.

Drainage excavation was continued on the Ankeny system, the work being completed on the 28th. On the 29th the drag-line excavator started moving to the Pine Grove district where it will be used to deepen the ditch which supplies the pumping unit from the project system.

J. L. Savage, designing engineer, was on the project May 9 and 10 in connection with the proposed replacement of the flume on the C Canal. D. C. Henny was on the project May 23 and 24 in the interest of the Langell Valley Irrigation District.—*Herbert D. Newell.*

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

The wet weather of April continued during May, except that precipitation was much heavier. Beginning with the afternoon of the 10th a heavy rain occurred in the western part of South Dakota amounting to as much as 6 inches of precipitation in certain sections. On account of the driving nature of the rain, ground that had been previously plowed was compacted to such an extent that it was necessary to recultivate before seeding. Fortunately a considerable portion of the small grain area had been planted prior to the rain. The temperature during the month was warm and pasture and alfalfa fields progressed nicely. There was no heavy wind during the month. The maximum wind velocity was 40 miles per hour.

Operation of canals was not begun during the month except for a small amount of water run through the feed canal into the reservoir. The river gates on this canal were closed early, after about 5,800 acre-feet had been diverted into the reservoir and another 5,000 acre-feet was allowed to run through the check gate below the crossing of Crow Creek on account of a muskrat hole under the wing of the check. With the heavy flood coming down Crow Creek it was deemed advisable to leave the check gates partially up to save the structure. On account of frequent rains there was no requirement for irrigation during the month. The maximum rainfall on the project recorded at the Vale station was 10.25 inches. Maintenance work was seriously handicapped on account of the heavy precipitation and consequent bad condition of roads, which made it almost impossible to do heavy freighting for more than half of the time during the month. From the Orman station work was continued on a number of small flumes and the foreman reported at the end of the month that the Brandsberg and Barker flumes were completed and piers were set on the Fegert and Reedy flumes. After the heavy rains on the 10th and 11th the maintenance crew from this camp was diverted to repairing culverts that collapsed during the flood. Two of these were in bad shape, due principally to the disintegration of the concrete in the bottom and sides. The Vale force finished up two chutes on Indian Creek Lateral and one on the Lyman Lateral, also one pipe drop on the Meade Lateral. As soon as the roads became passable after the heavy rain, the maintenance force was put to work repairing canal breaks, of which there were three large and three small ones on the South Canal below Vale. At the close of the month farmers had not yet responded to the call for help in that section and the work was progressing slowly on account of the limited force of the Government. It is anticipated, however, that sufficient labor will be secured from the outside to complete all repairs before there is any requirement for irrigation, especially since there have been recently two good rains on the south side of the river.

The North Canal was seriously crippled by the floods on the 10th and 11th as were also a number of the smaller laterals in the Newell district. Within three or four days after the rain all of the force that could be collected among the farmers was put to work on the Dry Creek wasteway

and everything done to secure as much help as possible. Camps were started in two places where accommodations are to be had for teams and men, and it is expected that by June 7 enough teams will be on hand to repair the works to such a point that water may be diverted through the canal before any serious damage is done to crops. The regular maintenance crew on the north side was engaged the first part of the month on general repairs to canals and structures and in placing bands on the small siphon south of Newell on Branch A Lateral. The bands seemed to have been entirely eaten away by rust on the underside of this pipe while the wood remains in almost perfect condition. Work on reconstruction of the Townsite Lateral siphon at Newell progressed with a fair degree of satisfaction, although hindered considerably by wet weather. It will be a fight for time to get this siphon ready for irrigation in case the weather happens to be hot and dry.

Labor during the month continued scarce, although no serious curtailment of work resulted therefrom.

Farm work has been decidedly backward on account of the wet weather and there is a rather large acreage of uncultivated land on the project that would have been planted to small grains had the season been suitable. Farmers are still planting oats and flax and have just begun planting corn. Alfalfa, although two weeks later than usual, is looking exceptionally well and growing rapidly. A general rain over the project on the 31st was especially beneficial to recently sowed grains and will insure good germination of seed.

Mr. James Munn, consulting engineer, arrived on the project on the 26th and stayed until the 29th. In company with the project manager he made a hurried but very complete survey of the damage done to canals and structures by the recent floods and gave valuable suggestions with reference to repair work and securing cooperation of the water users. A call was made on the president, vice president, and two other members of the board, all of whom were free to promise their assistance in securing a maximum force for repair work.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

The fore part of May was generally stormy and cold; the latter part clear and cool.

*Farming operations.*—The unusually high precipitation during the fore part of the month started the growth of all crops and reduced the demand for irrigation water to a minimum. Though the season is backward about three weeks, all crops are in excellent condition, especially alfalfa and grains. The cutting of the first crop of alfalfa is expected to begin about the middle of June and the harvesting of the pea crop will also begin about that time.

The five Spanish Fork Canals started using irrigation water on or about May 15. During the month about 2,872 acre-feet of water were used for irrigation purposes under the High Line unit. On the last day of the month, the High Line Canal was using about 105 second-feet of the water and the Spanish Fork River was discharging about 700. The Spanish Fork River reached a maximum discharge of about 1,500 second-feet on the 22d.

*Labor conditions.*—Labor conditions were somewhat easier than during April, due to the fact that the rush on the farms had partially subsided and also because the contractors on the road work were held up by numerous difficulties.

*Operation and maintenance, storage system.*—Work on the repairs to Strawberry Tunnel was suspended on the 20th, camp was closed, and part of the equipment was moved to the power plant. During the month about 1,000 feet of tunnel floor was smoothed and fixed requiring the placing of approximately 35 cubic yards of concrete. The timbered section at Station 30 was lagged on both sides and a portion of the floor also covered.



The run-off season in Strawberry valley began about the 15th. The usual patrol work was done on Trail Hollow and Indian Creek Feeder Canals. No difficulties were encountered other than the shoveling of snow from the canal prism at several places. New lignum-vitæ bearings were ordered for the 14-inch turbine at the East Portal.

*Operation and maintenance, power system.*—The power plant was operated without interruption and power furnished to the towns of Payson, Salem, Spanish Fork, and Springville.

The power canal above tunnel No. 1 was cleaned of loose rock and debris on the 16th.

The new runners and shaft failed to arrive during the month and the contemplated repairs are consequently delayed.

*Settlement.*—One farm unit was filed on during the month under the High Line unit, and 15 water-right applications were received and accepted.

*General.*—Confirmatory proceedings have been instituted in the district court relative to the purchase of 2,000 acre-feet of water by the Springville Irrigation District. Final certification will be made about July 6.

Negotiations were continued with the landowners under the proposed Santaquin pumping unit for the sale of 2,000 acre-feet of water. The question of time and rate of delivery of water under this proposed unit has been taken up with the Denver office.

Arrangements have been made for the convening of a board of engineers to inspect the Strawberry Tunnel in company with a committee from the water users; also another board to consider and review a proposed extension to lands in East Juab County.—*W. L. Whittemore.*

## OKANOGAN PROJECT, WASHINGTON.

Cool weather prevailed during May, with a number of cloudy days followed by high winds, which caused considerable evaporation of moisture from the ground. The records at the Omak station showed only a trace of rain amounting to 0.17 inch at Conconully. This was the dryest May on record for this section as May is usually considered one of our wettest months during the spring and summer.

The shipment of apples was completed during the month. The price remained at 5½ cents per pound with hay at \$20 per ton in the stack and potatoes at \$5.50 per bushel, with none for sale.

The routine office work was carried forward during the month as well as considerable work in connection with emergency purchasing and shipping of material and supplies, and the purchase of sandy land water right equities.

The work in the field consisted of the completion and operation of Duck Lake pumping plant, further work on the Duck Lake feeder canal and the completion and operation of Salmon Lake pumping plant, the completion of the sinking of well No. 2, and sinking of well No. 3 to water, the installation of two 15 horsepower engines at well No. 1 and well No. 2, the installation and operation of a 15 horsepower engine at a well being leased for the season at Spring Coulee, and the setting up and starting of the machinery at the temporary generating plant at Omak. The building in which the plant is installed was almost completed at the end of the month. The transmission line was also built and completed together with a telephone line on the same poles.—*Calvin Casteel.*

## Crop report, Sunnyside unit, Yakima project, Washington, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	41,370	Ton.....	175,822	4.25	\$22.50	\$3,955,995	\$95.62
Apples.....	10,425	Pound.....	119,293,750	11,443	.04	4,771,750	457.72
Barley.....	445	Bushel.....	12,015	27	1.50	18,022	40.50
Beans.....	186	do.....	2,232	12	3.60	8,035	43.20
Beets, sugar.....	2,516	Ton.....	25,160	10	12.00	301,920	120.00
Corn, Indian.....	7,611	Bushel.....	357,717	47	1.60	572,347	75.20
Corn, fodder.....	318	Ton.....	1,590	5	6.00	9,540	30.00
Corn, ensilage.....	614	do.....	6,140	10	10.00	61,400	100.00
Fruit, small.....	394	Acre.....			300.00	118,200	300.00
Garden.....	1,498	do.....			200.00	299,600	200.00
Hay, other than alfalfa.....	1,260	Ton.....	2,835	2.25	22.00	62,370	49.50
Hop.....	120	Pound.....	253,500	2,112	.25	63,375	528.12
Oats.....	220	Bushel.....	13,200	60	1.00	13,200	60.00
Pasture.....	6,146	Acre.....			25.00	153,650	25.00
Peaches.....	1,056	Pound.....	8,802,816	8,336	.035	308,098	291.76
Pears.....	1,655	do.....	18,911,685	11,427	.040	756,467	457.08
Prunes.....	1,309	do.....	3,158,907	10,223	.060	189,534	613.38
Potatoes, white.....	3,246	Bushel.....	658,938	203	1.25	823,672	253.75
Rye.....	148	do.....	2,960	20	2.00	5,920	40.00
Wheat.....	3,165	do.....	82,290	26	2.25	185,152	58.50
Less duplicated areas.....	6,816						
Cropped.....	75,886	Total and average.....				12,678,247	167.07
Nonbearing orchard.....	463						
Young alfalfa.....	3,218						
House and corral area.....	2,979						
Town-site area.....	1,950						
Irrigated without crop.....	6,696						
Less duplicated areas.....	1,192						
Other purposes.....	14,114						
Total irrigated.....	90,000						
		Areas.	Acres.	Farms.	Per cent of proj- ect.		
		Irrigable area farms reported.....	90,000	2,810	81.21		
		Irrigated area farms reported.....	90,000	2,810	81.21		
		Under water-right applications.....	29,877	979	26.96		
		Under rental contracts.....	60,123	1,831	54.25		
		Cropped area farms reported.....	75,886	2,810	68.47		





the 31st owing to reduction in run-off through this channel. The performance of the new transition at the entrance to Tieton Tunnel indicates an increase in capacity at that point over last year, and serves to show the need for similar reconstruction at North Fork Tunnel. Maintenance work consisted of repairs on D-1 siphon, repairs to the sublateral system, painting patrol houses, and reconstruction of telephone line to Bumping Lake.

*Investigation and surveys for new units.*—No field work was in progress. Board report on plans and estimate for the Kennewick unit was prepared and forwarded to Denver. Contract providing for continuation of surveys and preparation of plans for the Moxee unit was submitted to the Yakima irrigation district for signature. Negotiations were begun with the Yakima-Benton Irrigation District for a similar contract covering the Roza unit. These various irrigation districts have all made request for contract with the United States for purchase of water supply under the Warren Act.

*Cooperative investigations, Pasco project.*—The field work of securing records of water measurements on lands under cultivation in the vicinity of Pasco and Burbank was continued, the purpose being to secure data upon which to base determination of water duty for the proposed Pasco (Five Mile Rapids) project on the Lower Snake River.

*Storage unit.*—At Lake Keechelus, the timber contractor, S. G. Harlis, was engaged in felling timber in the reservoir area. Government camp was established at Meadow Creek (post office, Hyak, Wash.), and a crew of about 25 men with 6 teams was engaged in piling logs and brush for burning, in connection with the work of clearing the reservoir area.

At Lake Cle Elum, the Lake Cle Elum Lumber Co., under contract of May 3, 1920, commenced cutting timber.

At Rimrock (Tieton Reservoir site) the Northern Pacific Lumber Co. under contract of May 3, 1920, installed box-making machinery and made other preparations for starting operation of the sawmill for converting into lumber and fruit boxes the logs purchased from the United States.

A fire occurred at Rimrock on May 11, which destroyed the dormitory, hospital, and 6 cottages.—*J. L. Lytle.*

#### SHOSHONE PROJECT, WYOMING.

May was a cold, cloudy month with precipitation below normal on the lowlands, but with a considerable increase of snow in the mountains. The Shoshone River spring rise began May 5. A heavy June flood is expected. Seeding, generally, is completed, except for potatoes and for grain on lands cultivated the first time this season. Owing to the cold weather, growth was slow and alfalfa will probably not be ready for first cutting before July 1.

*Water supply.*—The surface of Shoshone Reservoir continued dropping until May 4, when it reached an elevation of 5323.1. Since then it has risen 21.6 feet; storage has increased 93,156 acre-feet during the month.

*Operation and maintenance.*—The canal system was operated the entire month; 11,000 acre-feet were delivered in 1,048 deliveries to irrigate about 20,250 acres. The total amount of water diverted was 24,294 acre-feet at a maximum rate of 880 second-feet. From May 19 on it was necessary to keep open one balanced valve at Shoshone Reservoir, as the diversion exceeds the flow through the open 42-inch blow-off pipe. A hole in the stilling pool of a main canal drop endangered the structure, and it was necessary to turn out the water to make repairs. Water was shut out from the 25th to the 29th. Considerable trouble was experienced all month in washouts of

minor structures, over 100 needing to be repuddled. Considerable bank erosion also occurred. It is thought this trouble arises from the fact that the ground at the time of the freezing last fall was nearly everywhere saturated with water. A partial stoppage by tumble weeds of a sublateral railroad siphon near Ralston caused it to overflow its banks and waste out a section of railroad track 75 feet long, disturbing traffic for a period of 3 days. Miscellaneous maintenance work consisted of repairs to numerous minor structures, cleaning of weeds from open drains, and priming and puddling the Frannie Canal and Lateral D-23 in the second unit of the Frannie Division. The cleaning of lateral A and realignment of the curved flume thereon has increased the capacity of that ditch so that demands can be met. The Monighan dragline cleaned 1½ miles of Frannie Canal during the month.

*Crops.*—Crops are practically marketed. Hay is difficult to secure even in small quantities. Two cars of wheat, 1 car of honey, 4 cars of sheep, 2 cars of stock hogs, and 2 cars of cattle were shipped from the project during the month.

*Labor.*—The labor supply at a pay rate of \$4.75 per day has been adequate.

*Drainage.*—On the Garland Division the Austin trencher and Lidgerwood dragline worked on the 26 drainage system in the area north of Bitter Creek. The dragline started moving to the Dry Lake area on May 22. On the Frannie Division the Bucyrus dragline continued on the excavation of Powell Drain, working two shifts daily.

*Field and office engineering.*—On the Garland Division one field party was engaged upon drainage investigation and miscellaneous surveys incident to construction and maintenance. On the Frannie Division one party was engaged on work incident to construction, topographic surveys of Sage Creek Valley and staking out head ditches for entrymen on new units.

*Settlement.*—Two original homestead entries were made and one relinquishment received. Two water-right applications were received for lands in private ownership.

*Construction.*—Construction by Government forces of the Second unit, Frannie Division, structures was actively prosecuted during the month, practically completing that work. Some work was also done on extensions to private lands of the lateral system of the first unit. The crews will be placed on construction of main canal structures in the third unit of that division for the month of June.—*J. S. Longwell.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

May weather was unsettled, with frequent storms which interfered with construction, operation, and maintenance and farming operations.

A dragline excavator was operated during the month on the enlargement of Two Medicine Canal.

A maintenance crew was located near the head of Two Medicine Canal, where a concrete culvert was completed and banks built to replace a timber flume, the ends of a timber flume rebuilt, and several miles of canal cleaned of rock and other slide material. At the lower end of the Two Medicine system a small crew worked cleaning and repairing the lateral system and a slide in the main canal. Three canal riders' camps were opened on the south side of the project.

There was no demand for irrigation water and no canals were operated.

Most seeding was done late, so crops are backward. The total area seeded will be less than planned on account of the lateness of the season.—*R. M. Snell.*

## FLATHEAD PROJECT, MONTANA.

During May construction of McDonald Lake Dam was continued, most of the effort being concentrated on the construction of the spillway and the spreading of riprap on the upstream face of the dam. Construction of the Mission A lateral system covering the territory northeast of St. Ignatius was continued with good progress. Construction of concrete lining on the Jocko E Canal was continued, 800 linear feet being laid during the month. All construction work was handled by Government forces.

On account of the lateness of the season only a small amount of irrigating was done, 455 acres being irrigated up to the end of the month. The quantity of water delivered to users was 272 acre-feet. Spring cleaning of canals and repair of structures preparatory to delivering water was continued. Several bad breaks occurred in the main canal of the Camas division.

A subcommittee of nine members of the Committee on Indian Affairs of the House of Representatives visited the project on May 31 and June 1. The first day was spent in taking a trip over the project and the second in taking testimony from farmers and Indians relative to the desirability of completing the project.

Crop conditions are excellent. Winter wheat especially has made a good growth. Spring wheat is somewhat behind on account of the continued cold weather. The prospects for bumper crops are much better than in any year since 1916.—*E. A. Moritz.*

## FORT PECK PROJECT, MONTANA.

May weather was cool and windy. Labor was scarce and practically impossible to obtain.

Work was continued on the paving of the F dike of the Little Porcupine Reservoir, and on May 31 this work was completed with the exception of placing 50 yards of concrete.

Work was continued on the foreapron of the Big Porcupine Reservoir with an average force of 4 four-horse teams. On the last day of the month, 10 four-horse teams were at work and should complete the work early in June.

Construction of the M-O check and turnout was begun during May and gravel hauled from other minor structures under the Big Muddy unit.

Water was delivered under all the units during the month. The gates were opened at the Big Porcupine storage dam on May 23 and water was available for use during the entire month. Every available man has been employed on the operation of Poplar River Canals to keep the canal clear of weeds. During the past three dry years the tumble weeds have spread over the country and the heavy winds have kept them blowing back and forth into the canal. The weeds were burned out three times over the entire length of the 25 miles of main canal, and after the water was turned in large quantities of them were blown in and formed jams, so that the water topped the canal banks in places and caused one bad break.

Crop prospects are good. The rainfall has been a little below normal but the weather has been cool. The cutworms and grasshoppers are doing considerable damage in some localities.

C. A. Lyman, of the Washington office, visited the project on May 26.—*R. M. Conner.*

## RIVERTON PROJECT, WYOMING.

The temperature during May was about normal. There were three fairly heavy rains, but the weather was generally fair, and the roads, though rough, were in reasonably good condition for hauling throughout the month.

Drag line No. 1 was operated for two shifts from May 1 to 7, inclusive, and from May 14 to 31, inclusive, and

one shift from May 8 to 13, inclusive. The total amount of excavation moved during May was 19,690 cubic yards, of which 941 cubic yards were excavated outside of the canal prism.

A new petition for the organization of an irrigation district was drafted and will be printed and circulated among the landowners for signature during June.

E. E. Roddis, district counsel, visited the project from May 5 to 8, inclusive.—*H. D. Comstock.*

## GENERAL OFFICES.

*Washington office.*—The director was in charge of the office during May, with the exception of the first week, when he was in attendance in Ottawa, Canada, at the meeting of the International Joint Commission regarding the distribution of the waters of the Milk and St. Mary Rivers, and the last day of the month when he was in New York in connection with the work of the American Society of Civil Engineers, of which he is president. During his absence the office was in charge of Morris Bien as acting director.

During the month announcement was made of the appointment of Morris Bien to the newly created position of assistant director, to take effect June 1, and of the resignation of Judge Will R. King, to be succeeded by Ottamar Hamele as chief counsel on June 15.

Chief Engineer Weymouth arrived from Denver on May 27 for a general conference, returning by way of New York on May 30.

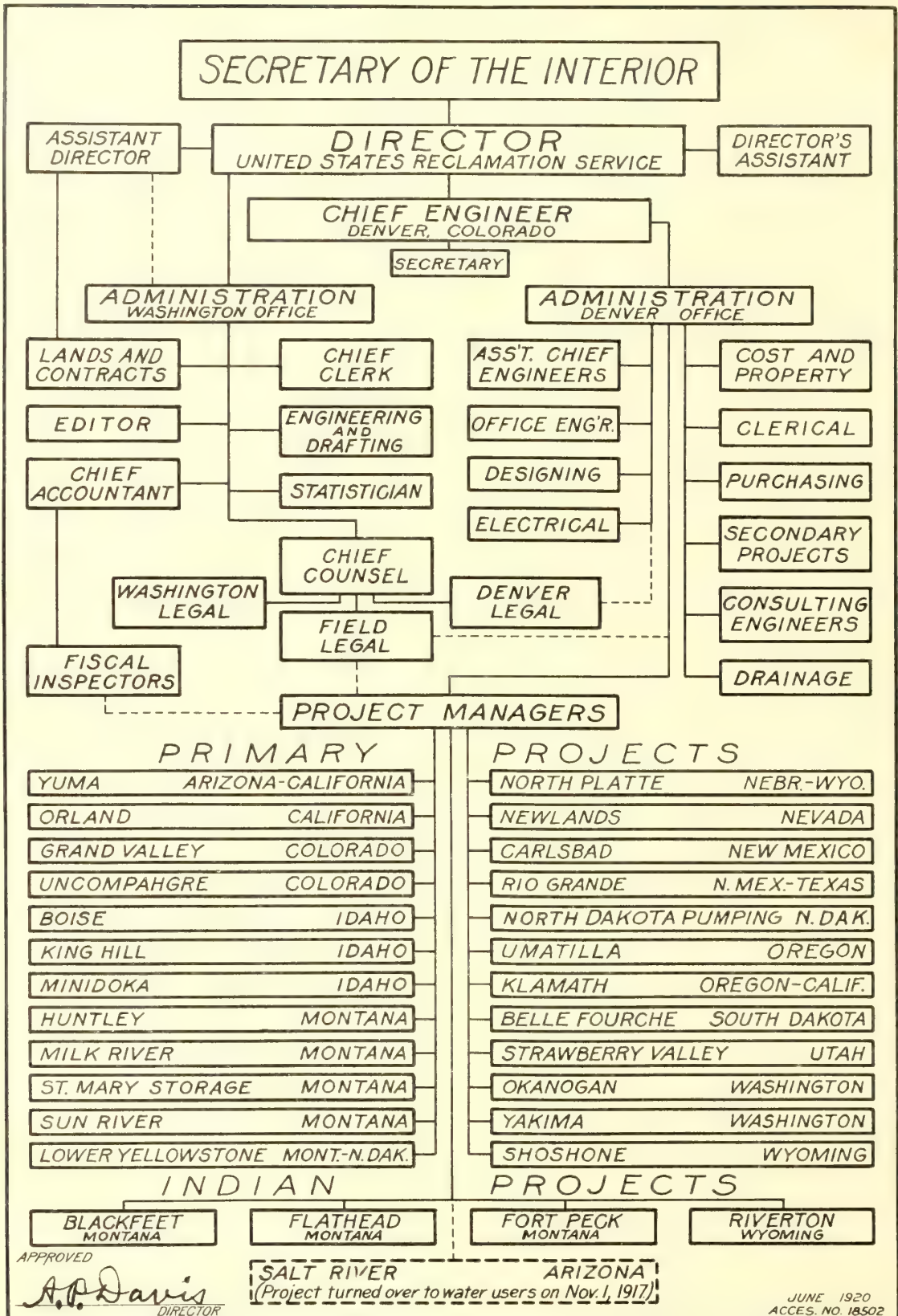
Among the visitors to the office were the following: Ex-Gov. Beck, of Wyoming; C. F. Consaul and Galen Dixon, representing Owens Valley irrigators; Judge Dixon, representing the California Power Co.; W. B. Kibby, of the Imperial Irrigation District; Mr. Heidell, State engineer of Montana; R. K. West, of Great Falls, Mont., attorney of the Fort Shaw Irrigation District; D. L. Reaburn; Methan Boyd, of Las Cruces, N. Mex.; W. R. Wheeler, former Assistant Secretary of Commerce; D. W. Ross; and ex-Gov. Spry, of Utah.

On May 17 a hearing was held before the Secretary of the Interior on the controversy between the Salt River Valley Water Users' Association and the Paradise Verde Irrigation District concerning reservoir sites on the Verde River. Among those in attendance were the following: Representing the Salt River Valley Water Users' Association, F. H. Reid, president, Mr. Gust, W. R. Elliott, Mr. Phelps, and F. W. Hanna; representing the Paradise Verde Irrigation District, A. L. Harris, Mr. Christy, H. E. Linden, and Messrs. Noetzli, Hedgepeth, Bartlett, Smith, Luckett, Egan, and Bowers; representing the Auxiliary Eastern Canal, R. E. Sloane, H. S. Reed, S. K. Baker, Frank Parker, and Messrs. Griffin and Entriken; representing the State of Arizona: Mr. Seiboth, of the Land Department; Dr. A. J. Chandler also attended the hearing.

*Denver office.*—The chief engineer returned from the field on May 9, having visited the Yakima, Okanogan, and American Falls projects during May. He left for Washington, D. C., on May 24 and was there at the end of the month. Assistant Chief Engineer R. F. Walter was in the office until May 29 when he left for the Uncompahgre project. Assistant Chief Engineer Chas. P. Williams visited the Milk River, Sun River, and Shoshone projects during May. Official visitors included Messrs. C. A. Lyman, E. A. Moritz, and H. J. Gault.—*Chas. P. Williams.*

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## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

Hon. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSSANG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamel, chief counsel; J. B. Beadle, director's assistant; C. J. Blanchard, statistician; Hugh A. Brown, editor; E. C. Bebb, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk; F. G. Hough, Helena, Mont., and C. E. Platt, Denver, Colo., examiners of accounts.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Loney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD LEGAL OFFICES.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

**Denver, Colo.**—Law section office of chief engineer; E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr, district counsel; R. M. Patrick, district counsel located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauf, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Balfontaine, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; C. C. Hogue, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. A. Keever, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Rothl, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; L. H. Kline, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, acting project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—P. J. Preston, project manager, Montrose, Colo.; A. H. Leach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppeimann, chief clerk; E. M. Philebaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

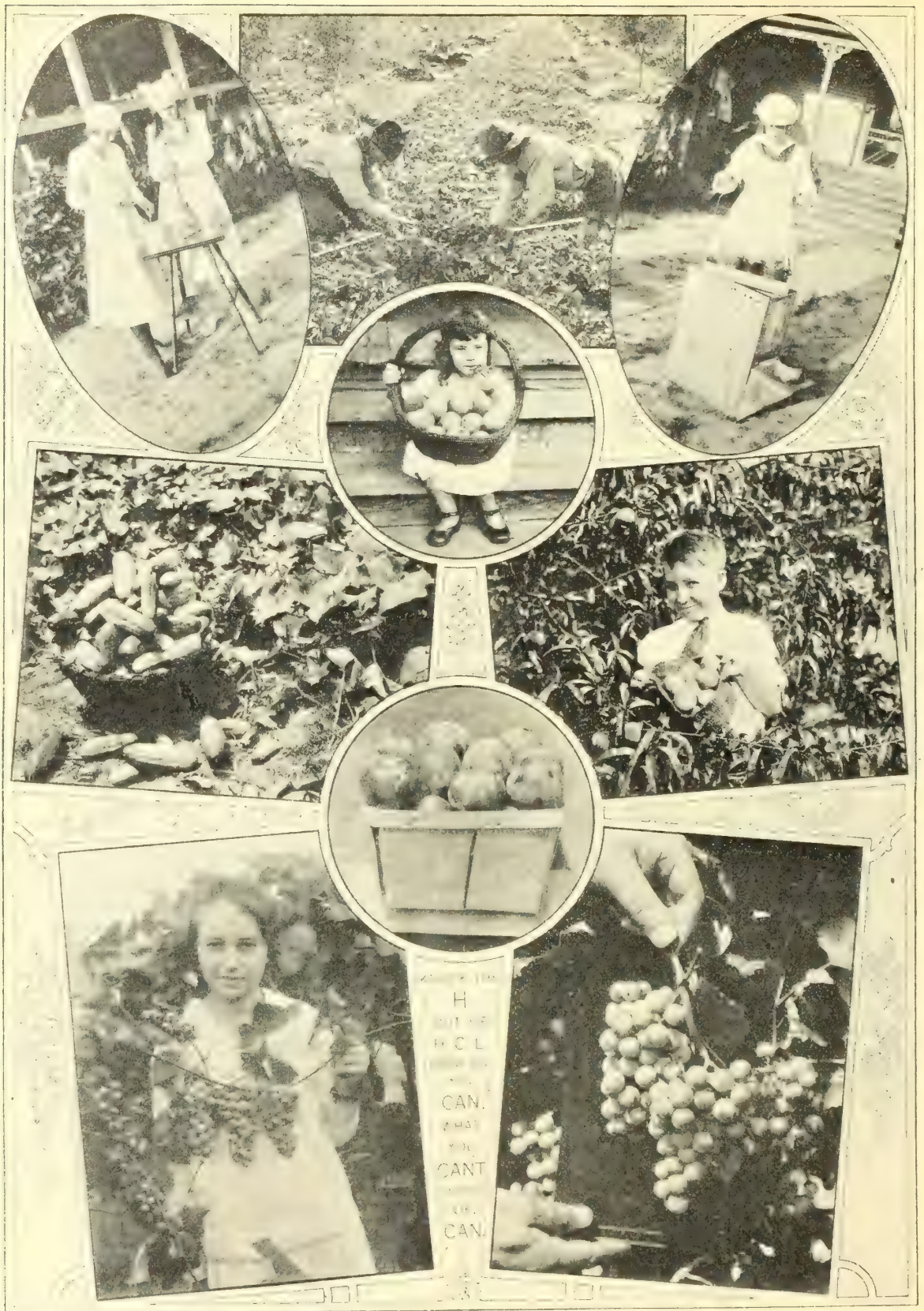
**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk and fiscal agent.

WORK AND SAVE. BUY GOVERNMENT SECURITIES







# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

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VOLUME 11, No. 8

PRICE { NOTHING FOR OUR WATER USERS.  
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AUGUST, 1920



THE SPIRIT OF VACATIONS.



### RECLAMATION PLANKS IN PARTY PLATFORMS

#### Democratic

We favor ample appropriations for the continuation and extension of this great work of home building and internal improvement along the same general lines, to the end that all practical projects shall be built, and waters now running to waste shall be made to provide homes and add to the food supply, power resources, and taxable property, with the Government ultimately reimbursed for the entire outlay.

#### Republican

We favor a fixed and comprehensive policy of reclamation to increase national wealth and production.

We recognize in the development of reclamation through Federal action, with its increase of production and taxable wealth, a safeguard for the Nation.

We commend to Congress a policy to reclaim lands and the establishment of a fixed national policy of development of natural resources in relation to reclamation through the now designated Government agencies.

## ACCOUNTS FARMERS SHOULD KEEP.

By H. C. M. Case, Office of Farm Management and Farm Economics, U. S. Department of Agriculture.

A man's bank balance at the end of a year is not a good indication of his business ability, especially if the man is a farmer. This statement has special application to the man who is building up and developing his farm. Many years, though a farm yields a good profit, the profit is not recognized because it may be expended on new improvements, may be represented in the purchase of better live stock, or may appear in one or more of a number of different forms which represent added wealth for the owner.

### THE KIND OF A RECORD TO KEEP.

No farmer can afford to do without an inventory of his farm and equipment, taken once a year, and a cash account of the farm business. The form of the record is of little importance if it furnishes the needed information to show the farm profits. The inventory is absolutely necessary, since a cash account alone usually tells no more than a bank statement, and many times the cash account includes the farm business and personal and household expenses.

First of all, the cash account, to be of use in studying the farm business, should be divided to show farm receipts and expenses separate from the household and personal accounts. A good way to decide in which account to enter items is to divide the farm business and household accounts in the same way that a storekeeper might divide them in keeping account of the store business and, at home, a separate record of all the personal and household expenses. In this way the business receives credit for all of the profit it produces. In the same way the farm should receive credit for all that it produces, even though a large part of the profits are spent for personal or household expenses.

The necessity of having both the inventories and the cash account of the farm business can be well illustrated by the following summaries of a farm business.

#### Cash account, 1919.

<b>Farm receipts:</b>	
Dairy products.....	\$960
Veal calves.....	98
One horse.....	140
Two cows.....	210
Ten hogs.....	324
Wheat.....	855
Alfalfa hay.....	825
Miscellaneous receipts.....	216
<b>Total receipts.....</b>	<b>\$3, 628</b>
<b>Farm expenses:</b>	
Hired labor.....	\$440
Machine work hired.....	73
Taxes and water rights.....	345
Live stock purchased.....	1, 075
Machinery and repairs.....	255
Miscellaneous crop expenses.....	131
Other miscellaneous expenses.....	340
<b>Total expenses.....</b>	<b>2, 659</b>
<b>Total receipts less total expenses.....</b>	<b>969</b>

The cash account as shown above indicates that \$969 was received in excess of the expenses, but this cash account does not indicate whether the property on hand is worth more or less than a year ago without using it with the inventory statement, as follows:

#### Inventory of farm business.

Item	Num- ber.	Jan. 1, 1919, value.	Num- ber.	Jan. 1, 1920, value.
Land, 80 acres, at \$200 per acre.....		\$16, 000		\$16, 000
Buildings and improvements.....		5, 600		5, 470
Machinery.....		430		520
Horses.....	5	840	4	675
Cattle.....	5	180	13	1, 130
Hogs.....	4	95	6	120
Poultry.....	100	100	90	90
Wheat (bushels).....	75	150	800	1, 600
Feeds.....		1, 030		670
<b>Total.....</b>		<b>24, 725</b>		<b>26, 275</b>
Subtract opening from closing inventory.....				24, 725
<b>Gain in farm inventory.....</b>				<b>1, 550</b>

The summary of the inventories shows that the value of the farm, equipment, and products on hand is worth \$1,550 more than at the beginning of the year. The net farm profit is then represented as follows:

Total receipts, less total expenses.....	\$969
Gain in farm inventory.....	1, 550
<b>Net farm profit.....</b>	<b>2, 519</b>

#### THE VALUE OF THIS RECORD.

In the illustration given above the inventory was essential in determining the farm profit for the year. In studying the inventory it will be seen that the herd of cattle was increased from 5 to 13 head, which increased the value \$650. This is a good example of what is happening on a farm where a larger business is being developed, which requires a larger investment in working capital. Note that at the beginning of the year only 75 bushels of wheat, valued at \$150, were on hand, while at the end of the year 800 bushels of the new crop were still on hand, valued at \$1,600 or \$1,450 more than at the beginning of the year. This is a good illustration of the fact that farmers often do not market their produce in the same year it is grown, while in the succeeding calendar year two years' production of the same crop may be marketed.

Another purpose served by the inventory is to make allowance for the annual depreciation due to the year's use of buildings and other equipment. Some years a man may add considerable improvements to buildings, or buy more than the normal amount of machinery, which will last many years. The cost of such additions to the equipment should be charged over all of the years the improvement is used, instead of charging the business with the



full cost in the year purchased. The only way to do this is to determine the remaining value of all of the improvements at the end of the year, as is done when an annual inventory is taken. For example, in the inventory given above, the buildings and other improvements were inventoried at \$5,600 at the beginning of the year and only \$5,470 at the end of the year, a decrease of \$130, which represents the decrease in value due to the year's use. Machinery shows an increase of \$90, but the expenses show that \$255 was spent for new machinery and repairs. The increase in value of machinery at the end of the year is due to the value of new machinery purchased.

The average investment shown by the two inventories is \$25,000. If the money represented in this investment was loaned at 6 per cent interest it would earn \$1,500 annually. The total net farm profit was \$2,519, which leaves \$1,019 to pay the farmer and his family for their labor in addition to the value of the living secured from the farm. A man's capital and his labor each have a market value. The farm accounts kept should, first of all, show whether or not the farm profits give a satisfactory return for the use of the capital and the labor expended.

#### OTHER THINGS THE RECORD WILL SHOW.

The record of the farm business which provided the information shown above will give much valuable additional information when used in the right way. The above record does not indicate whether this farm made as large profits as it should or not. If a number of men in the same community, on land which has the same advantages and disadvantages, keep the same kind of records, the records will serve to show what profits can be expected in that community and which type of farming pays best when the records are kept over successive years on the same farms. With the help of a county agricultural agent, or some other local leader, a comparison might thus be worked out to show some of the important factors that determine the success of a farm in a given region.


Such a comparison can be used to show the size of farms that are most successful, the combination of crops or livestock enterprises that return the highest profits, the yields of crops that one should expect, the returns per dairy cow that one should secure at local prices of dairy products, the amount of labor required for different types of farms, the proportion of receipts from live stock and from crops that promise the best returns, and certain other factors. No additional records are required in this connection.

The measures of the farm's success suggested above are only relative, but often they serve to show at what point one should begin in order to improve the organization of his farm. For example, such comparisons may show that generally farmers growing a comparatively large acreage of a certain crop are making larger profits than farmers growing a large acreage of a different crop. The evidence may not be sufficient to prove the case, but it will show that the next step is to determine the relative profitableness of the competing crops under average conditions. This,

however, involves a second step in farm accounting, which is cost accounting. Cost accounting which involves keeping a record of labor expended on different enterprises, should not be attempted until one has made a good study of the whole farm business by using the inventories and cash account. Cost accounting information, to be of greatest use, should not be based on a single record. It is of most value in determining the relative profitableness of different crops when costs on a group of farms are taken as a means of securing a fair average cost for the community. Here again a county agricultural agent or some other local leader trained in farm management can be of help in studying out problems which can be settled most effectively by comparing the results of a group of men.

	1919	1920	Average
Net receipts per acre	\$31.50		
SIZE - Total Acres	80		80
SIZE - Total Crop Acres	60		60
CROP YIELDS			
Wheat	24	35	26
Barley	20	4 tons	24
Alfalfa	6	10 tons	7
Other crops			
Return Dairy product per cow	\$85		\$100
Outlay for 100 worth of feed and	\$90		\$100

*Something like this*



What this farmer found out about his business by keeping accounts.

#### THE NET WORTH OR CREDIT STATEMENT.

An excellent use to which the inventories can be put is the preparation of a credit statement or annual net worth statement. Bankers when asked for credit are interested in two things that the net worth statement will show, which are—"How much are you worth?" and "How much more you are worth than a year ago?"

The determination of the net farm income provides hardly sufficient information on which to borrow money. A man who has a good income is a poor risk if the entire income is spent for personal gratification and household necessities. The net worth statement, prepared once a year, furnishes a good basis on which to decide how much money to loan a man. This is a statement of the value of all the property a man owns, including money owed him,

and the statement of all of his debts. The difference between the two sums represents one's net worth; that is, the net worth represents the value of all property one owns after all debts are paid. If the net worth statement is prepared once a year it will show whether one has saved any money during the year after paying all household and personal expenses; that is, whether or not one is getting ahead and laying up something for old age.

Usually the inventory of farm live stock and equipment represents a large part of a farmer's property. As an illustration of a net worth statement, the inventories of the above account will be taken as a basis and it will be assumed that the additional items presented as follows represent the other facts concerning the owner's net worth:

	Jan. 1, 1919.	Jan. 1, 1920.
<b>RESOURCES.</b>		
Value of land, live stock, feed, grain, and equipment (from inventory).....	\$24,725	\$26,275
Household furnishings.....	1,500	1,800
Automobile.....	650	540
House and lot (in town).....	3,500	3,420
Liberty bonds.....	800	800
Note receivable.....	500	
Bills receivable.....	75	120
Cash on hand in bank.....	480	1,475
<b>Total resources.....</b>	<b>32,230</b>	<b>34,430</b>
<b>LIABILITIES.</b>		
Mortgage on farm.....	6,500	6,000
Note payable.....	200	900
Bills payable.....	300	350
Interest due.....	120	360
<b>Total liabilities.....</b>	<b>7,120</b>	<b>7,610</b>
<b>Net worth (subtract liabilities from resources).....</b>	<b>25,110</b>	<b>26,820</b>
<b>Increase in net worth.....</b>		<b>1,710</b>

The above illustration shows that the net worth had increased from \$25,110 on January 1, 1919, to \$26,820 on January 1, 1920, an increase of \$1,710 for the year. It will be recalled that the net farm profit was \$2,519 and some income should have resulted from rent of house and lot, and interest on bonds and notes receivable. The statement shows that a part of the year's income had been used to meet the household and personal expenses, so that after all expenses had been paid all of the property owned was worth only \$1,710 more than a year ago. A credit statement as shown above, taken once a year, answers the two questions the person who loans you money would want to know about your business, that is, "What is your total net worth?" and "What was the increase in net worth for the year?"

Keeping the record of the farm business shown above is not a hard task. It is only a question of acquiring the habit of keeping account of all moneys received or paid out and taking an annual inventory. During the year it is only a matter of spending a few minutes a week or each time a trip is made to town to record the business transactions that took place. Town business men are usually thought of as keeping records of their business. The aver-

age farmer has more money invested in his business than most of the men in the local town with whom he does business. Hence, farming should be placed on the plane of a business and records should be kept that will show clearly its success. The inventory and cash account, which may be called the financial record, of the farm business is the first step in farm accounting and should be kept on all farms. Many farmers can afford to keep additional records such as cost accounts, but that is a second step that should be taken after the first step has been accomplished.

## IRRIGATION ABROAD.

### Southern Alberta, Canada.

Another large area of land in Southern Alberta was brought under irrigation during May when water was turned into the Canada Land & Irrigation Co.'s main ditch east of the Little Bow Reservoir, for irrigating what is known as the Vauxhall District, where 5,000 acres of land purchased by settlers from the United States and elsewhere will be put into crop this year. The water will be ready for use on the farms.

Water was turned into the main ditch from the Bow River intake, 40 miles east of Calgary, a year ago last fall, and since then the huge reservoir in the Snake Valley, known as Lake MacGregor, which is 9 miles long and holds enough water to run the entire project for a year, has been filled. Some weeks ago, water was turned from this reservoir into the main ditch to the east, and the reservoir at Little Bow, which holds enough for a month's operation, was filled. Now the water has been turned out into the ditches from this reservoir.

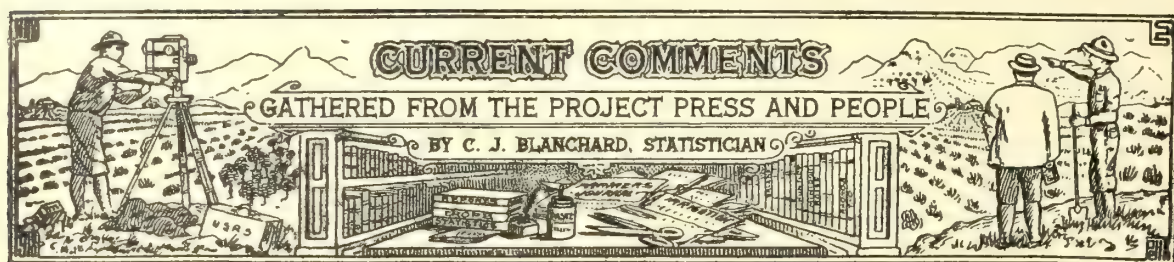
The turning of the water into the ditches marks the beginning of the operation of an engineering project which has been in the course of development for a number of years. It is 10 years or more since the project was first undertaken, and since then it has been through various reorganizations and changes, ending in the amalgamation of three distinct companies into the Canada Land & Irrigation Co. The main ditch of the project is 176 miles long, and from this it is planned ultimately to irrigate 220,000 acres of land.—*The Irrigation Review*.

## BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture,  
Washington, D. C.

No. 1120. *Control of apple powdery mildew.*—In the apple-growing districts west of the Rocky Mountains, and especially in the Pacific Coast States apple-powdery mildew has become an important orchard disease that annually causes heavy losses. This illustrated bulletin tells how to prepare the spray materials needed and how to apply them. A spraying schedule, showing concisely when and with what to spray, is included.





The Society of Visual Education of Chicago, Rollen D. Salesbury, University of Chicago, president, is arranging to take several thousand feet of our project negatives and make prints therefrom. This society, cooperating with the schools of the United States, is planning to place these films where they will be shown daily to the school children. In other words, by means of pictures the 20,000,000 children of America are to be made acquainted with the results of national reclamation and the resources of the Great American Desert.

In the negative selected by us the views include scenes on the following projects: Salt River, Yuma, Rio Grande, Orland, Newlands, Grand Valley, Minidoka, North Platte, Shoshone, Carlsbad, Yakima, and Okanogan. On our return from the West additional scenes will be shown from Sun River, Klamath, and Flathead.

More than 3,500 motion-picture machines are now installed in public schools, and from these centers comes an enormous demand for pictures of educational value. In the arrangement of scenarios of reclamation the following general topics have been selected for projection:

Engineering, including the numerous important spectacular and interesting structures like the Roosevelt, Elephant Butte, Shoshone, Arrowrock, Minidoka, Laguna, Grand Valley, and Lahontan dams.

Agriculture, including desert before and after on a number of projects; wheat, oats, barley, and alfalfa harvests; the sugar-beet industry from planting to the factory; special crops, cabbage, tomatoes, beans, cotton, and potatoes; and methods of plowing, cultivating, and planting.

Horticulture: Deciduous and other fruits, nuts and small fruits, dates, figs, etc., from best scenes on Yakima, Grand Valley, Yuma, Salt River, Orland, and Okanogan.

Road making: Yuma and Minidoka.

Scenic: Salt River, Minidoka, Klamath, Flathead, and the Jackson Lake country.

School scenes: Salt River, Minidoka, Flathead, and Grand Valley.

As a means of spreading information concerning our projects no better medium could be desired. The child brings its lesson home, the pictures shown are discussed in the family, and an interest is awakened. Consider for a moment the advertising value of pictures of prosperous farming on one of our projects shown in a thousand schools by experienced teachers who have prepared a talk on the subject. No better method could be devised for the dissemination of information than these pictures. Naturally

we are rejoicing that this opportunity has come to us to place the West so prominently before the future citizens of America.

There is a unanimity of sentiment among citizens of the Colorado Basin in Arizona and California in favor of a great national reclamation project to conserve and utilize the waters of this great stream. The extraordinary development of this remarkable region in a decade, the enormous potentiality of the million acres awaiting reclamation, and the determined stand of all classes of people who dwell in this favored region for Government assistance presages the removal of all obstacles. At a recent conference in Los Angeles Director A. P. Davis met about 50 of the representatives of the leading organizations of the valley and discussed the ways and means for initiating the work. The meeting went on record as favoring the vesting in the Secretary of the Interior authority to determine the construction, operation, and distribution of water.

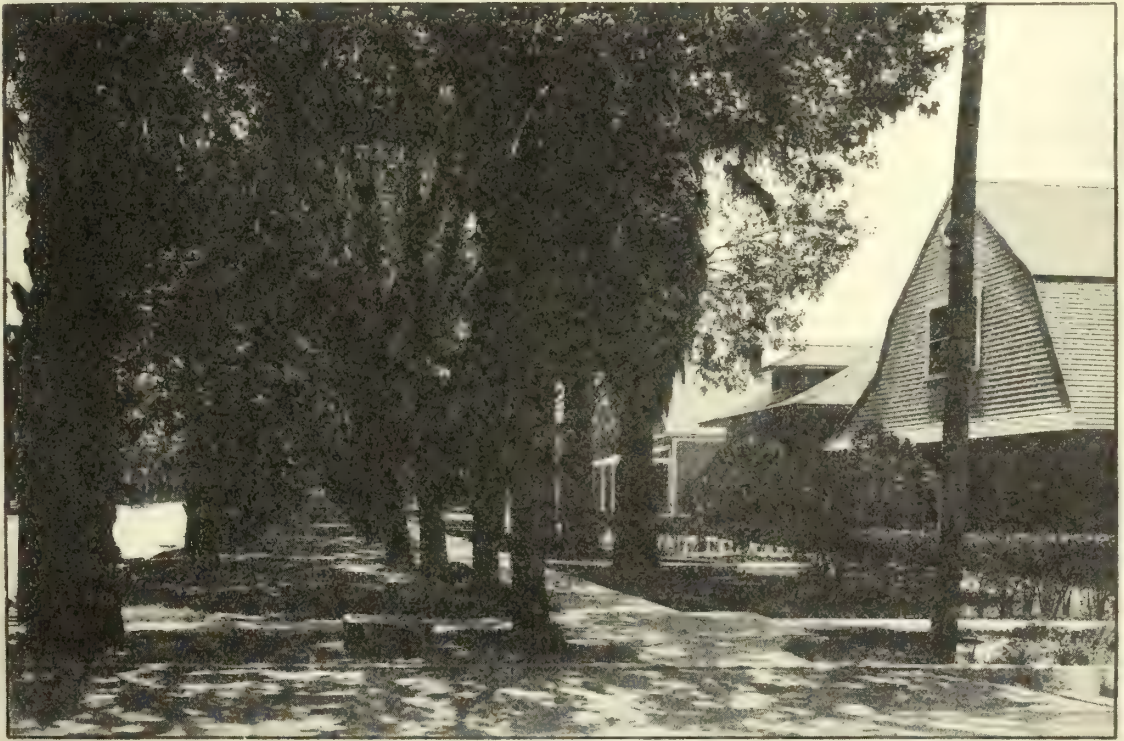
As reported in the local press, Mr. Davis said that his department is prepared to start the survey at the Boulder Canyon site and elsewhere at once. He expressed himself in favor of the proposed all-American canal and added that if later it should be found not desirable the plan can be changed or abandoned.

Mr. Davis emphasized the necessity of unified action by the southwest States and said he felt sure that there can be no antagonism between communities of the upper and lower river because the short upper river irrigating season comes at high-water periods when the supply is ample for everybody. He said that he has always maintained that there can be no conflict of interest over the division of the water between the United States and Mexico.

About 50 men attended the conference, including members of the Imperial Valley Irrigation District Board, Coachella Valley, Palo Verde Valley, Yuma Valley, William Mulholland, Government engineers, and others. L. K. Chase, chairman of the Chamber of Commerce Committee on Reclamation and Colorado River, presided.

A committee of seven is to be appointed by Mr. Chase to assemble such information and data as may be requested by Director Davis. This committee will probably report at a conference to be called in San Diego by Mr. Davis. The report on the Colorado River survey by the Secretary of the Interior is to be in the hands of Congress by December 6.





Upper: The Capitol, Phoenix, Ariz. In a setting remindful of Algeria this beautiful building stands, the seat of government of the progressive State of Arizona.

Lower: Residential street in Phoenix. A fine community spirit is shown in civic tree planting and the making of beautiful lawns.



A resolution was passed requesting the University of California and the University of Arizona to report on the State lands in the Colorado basin that may be brought under water through the construction of the Boulder Canyon reservoir.

Approval was expressed of the Kincaid bill, which provides for an examination and report on the condition and possibilities for development by irrigation of Imperial Valley lands. The bill provides for a general survey of the entire situation in Imperial Valley and means for extending the area under water. The total cost of the survey will be \$60,000, of which \$20,000 has been appropriated by Congress and \$20,000 by Imperial irrigation district. The remaining \$20,000 Mr. Davis expects will be provided by other interested districts.

Mr. Mulholland commended the selection of the Boulder Canyon site, saying he felt sure a dam there is practical, that the formation is solid, and that it is believed that bedrock will be reached in 25 to 30 feet. The general expression was that there is enough water, with conservation, for all the irrigable lands in the basin on both sides of the international boundary line.

The belief was expressed by a number of the delegates that, if it seems advisable, the building of the dam could be financed by bonding the lands of the districts interested without waiting for Government action.

#### NOTED HERE AND THERE.

*Arizona, Salt River project.*—In keeping with the phenomenal development of the entire valley of which it is the metropolis, Phoenix during the past decade has made startling progress. Its population during the period 1910-20 has increased 160.9 per cent, and now registers 29,055. Not alone in increased population is her record a prideful one. Her citizens, visualizing a community of 100,000 souls with optimistic farsightedness, have planned a model city. Its business and civic centers are modeled after the best plans of modern cities, and in the types of structures erected and projected the experience of prominent builders has been drawn upon.

One of the present and growing charms of the city is in the residential section. To-day Phoenix partakes of much of the artistic beauty of southern California's famous cities. The community spirit is everywhere in evidence, and in the highest sense is exhibited in home buildings and surroundings. Too much stress can not be laid upon the great improvement seen in the development of an up-to-date school system. Phoenix schools now rank with the finest in the country. Her park systems, country clubs, and recreational resorts are being improved and extended in keeping with the progress along other lines. It seems a far cry to the straggling old town of 1902, with its low-roofed adobe dwellings, its unpaved streets, and the wide areas of desolation surrounding it. Wealth beyond the dreams of its pioneers has followed quickly in the wake of reclamation. The beneficence of national reclamation was never more clearly shown than in this valley and the charming municipality of Phoenix.

W. J. Longmore, east of Chandler, reports a net profit of \$2,100 from 40 acres of alfalfa. This represents only two cuttings, and as Mr. Longmore is good for at least four more cuttings, his profits should normally be about \$6,000 or \$150 an acre.

The first cutting sold for only \$10 an acre because it contained some foxtail. He secured 42 tons of hay. The second cutting gave him 70 tons. The expense of water, cutting, baling, etc., was deducted, leaving a balance of \$2,100.

*Arizona-California, Yuma project.*—A new railroad line has been opened from San Diego to El Centro, where it connects with the Southern Pacific Railroad system; and at present through trains are being run from San Diego to Yuma, at which point parlor cars are transferred to the regular transcontinental service of the Southern Pacific and Rock Island systems, thereby giving direct connection from San Diego to New Orleans and Chicago.

This line brings the Pacific coast about 100 miles closer to Yuma and affords a convenient and pleasant trip from Yuma to the Pacific coast. It also brings the business facilities and competition of San Diego directly to Yuma and it is expected that this will have a marked influence on the development of the Yuma project.

*California, Orland project.*—Orland Jerseys consigned to the Salem, Oreg., sale made a hit with the buyers. Dr. Hand shipped 22 head for the sale, and with the exception of one bull disposed of the entire lot at good prices. Among the sales we note the following: Brilliant Jersey Queen with two world's records, \$1,000; Gold's Nehalem Beauty, \$960; Lumas Lola (2) \$850; Brilliant Spray's Glonana 15 month's heifer, \$475.

*Colorado, Grand Valley project.*—The sugar-beet crop of the Grand, Gunnison, and Uncompahgre Valleys is destined to be far in excess in tonnage of any previous year. The beets are looking fine. It will tax the capacity of the Holly sugar corporation to handle the tonnage in the Grand Junction and Delta factories, provided the latter is ready to run for the present year's crop.

The Mesa County Pure Bred Breeders' Association has been formed for the purpose of improving the quality of the live stock on the farms and ranches of the county. Some 20 stock breeders were present at the meeting and became charter members of the association. It is intended to spread the scope of its work until included on the membership rolls will be the name of every live stock man in the county.

*Idaho, Boise project.*—From a recent letter by C. E. Fiatt, of the Washington office, to the director, we extract the following boost for the Boise project:

"This was my first visit to Boise, and I was much impressed with the prosperous condition of the irrigated lands in that vicinity. While the Boise project has always raised a great many potatoes, I believe that they are going in stronger in that line this year than they ever have before. Most of the crops are already contracted for at \$3, and better, per hundredweight on the ground. The

potato crop appears to be especially flourishing. One field containing 70 acres of potatoes will, if the yield is as great as the adjoining field farmed by the same man last year, return to the owner something like \$92,000 this year. Another item of crops that impressed me is the fact that a 10-ton yield per acre of alfalfa in three cuttings is not a great deal out of the ordinary, although of course, the average for the entire project is much less."

*Idaho, Minidoka project.*—The Chamber of Commerce of Rupert, Burley, Buhl, and Paul has gone on record as favoring the Snake River Valley Community plan. The plan includes moving pictures of different localities in the Snake river valley, with follow-up advertising of a local nature.

Recently a number of purebred Holstein owners of the county met at the farm bureau office in conference with H. A. Mathiesen, assistant state dairy specialist, and the county agent. These Holstein breeders are determined to see a development along dairy lines in Minidoka County and to further this work they have organized a purebred Holstein-Frisian association and will take up several important lines of work in dairy improvement.

Some of the main features which will be taken up are a bull association, which will consist of from three to five blocks in the county; cow testing association work; T-B eradication; calf club work, and, in general, dairy improvement which includes feeding and the care of milk and butter, as well as silo construction.

Burley had the distinction of being the second largest shipping point for late potatoes in Idaho last season, and with a good stand on practically the entire 5,500 acres now in spuds, the farmers are greatly encouraged with the prospects of ranking first.

The Minidoka project not only has the largest acreage ever under cultivation here, but the crop prospects are at least 25 per cent better than ever before at this season of the year.

Recent frosts damaged a few beets which had been thinned and left exposed, and caused some alfalfa and wheat on dry ground to wilt, but the actual loss even to the individuals whose crops were worst hit is very light. We have the largest acreage of beets and the best stand ever grown tributary to the Burley sugar factory. The potato acreage is larger than ever before, with every field where they have had time to come up, showing an excellent stand. This is the first year that the wheat crop of the project as a whole has been really promising, and it will now compare favorably with the best in the land. Although much alfalfa has been plowed up during the past two years to make room for these other crops, there is promise of a full hay harvest this season because of the excellent start the crop now has.

With assurance of an ample water supply for the full season, it is safe to predict a crop 25 per cent heavier on this project than during any previous year. Market prospects of these products are also promising. There is little

question that sugar beets, potatoes, wheat, and hay will demand record prices at the end of the season. In short the general prospects for Burley and the surrounding country are the best possible at this time, and although this section is experiencing a feeling of depression general throughout the world, this is one of the few communities which is actually increasing production, providing a cure for the world's ailments and local prosperity is certain to come as a result. All the towns on the project report the same general prosperous condition of crops and business.

In a State contest, conducted by the University of Idaho at Moscow, Rupert cheese was adjudged first, with a score of 94.

Rupert cheese scored 40 out of a possible 45 on flavor, 29 out of a possible 30 on texture and body; perfect color and perfect finish.

The Shorthorn sale put on by Frank Sullivan's Sons drew an interested crowd despite the threatening weather, and was a decided success from every point of view. First, because every one of the fine Scotch-topped sold went in the county and will be the foundation of fine herds.

Mary Gloster, sired by Pride of All, topped the sale at \$700, Fred Stanley being the purchaser. Twenty animals were sold, averaging \$311, principally cows with calf at side, a few fine heifers, and one bull. Col. E. O. Walton and Col. W. J. Hollenbeck make a fine team in the purebred ring, and Guy Shillington's barn, commodious and well equipped, was an ideal place, with the beautiful pasture in front for a show ring.

The free bull, given away to the lucky purchaser, was won by W. S. Hall, of Hopewell district; \$25 went to the lady or boy guessing nearest its weight, 770 pounds.

*Montana, Flathead (Indian) project.*—A million dollars worth of potatoes are now growing in Flathead County, according to H. N. Louis, manager of the Northwest Potato Exchange.

Louis said there were approximately 6,000 acres planted in potatoes in the county this year, and with the present prospects for yield and price he believed that the farmers of the county will receive at least \$1,000,000 for their 1920 crop.

A campaign has been put on throughout the county to raise funds for the construction of a number of storage warehouses, all to be built by one warehouse company and handled by one concern. Farmers of the valley have already purchased over \$8,000 in the stock of the corporation, and the business men of Polson have also gotten in for several thousands of dollars. Kalispell business men will now be asked to take about \$5,000 worth of stock.

*Montana, Milk River project.*—Several years ago Saco farmers began to grow sunflowers for stock food. They built silos and gradually went into the dairy business. Sunflowers, like Russian tristles, made a crop whether it rained or whether it didn't, and when put in a silo made one of the best rations known for dairy cows. Some



farmers cut them and let them stand in the fields in shocks like corn and during the winter used the feed the same as fodder; however, this method never proved as satisfactory as the silo way.

The yield of sunflowers is from 10 to 40 tons per acre, and therefore a very few acres of this favored crop are necessary to feed a large herd of cattle. Many of the heads are allowed to ripen for chicken feed, and thus the poultry business has also proven a very profitable side line. Land that used to sell for \$10 an acre now commands \$100. Sunflowers and cattle require little labor and make rich returns.

The farm bureau of Phillips, Roosevelt, and Valley Counties cooperated with the Valley County Brotherhood of Thrashermen in putting on a thrashermen and tractor school at Glasgow lasting four days—July 7-8-9-10.

Lectures by factory men, field men, agents, and practical thrashermen and farmers, and slides and moving pictures on the different subjects took up the first two days of the school. The last two days of the school were given over to field demonstration with the new machines in action.

Leslie Sherman, of Glasgow, is the proud possessor of a thoroughbred Jersey heifer, a gift to him from his grandfather, R. O. Jones, of the Ticonic Jersey farm at Winslow, Me. Mr. Jones founded his herd in 1886 with Jerseys bought from the famous Hood farm in Massachusetts. Mr. Hood, of Sarsaparilla fame, purchased his cattle from Queen Victoria's herd in England and they came originally from the Isle of Jersey.

*Montana, Lower Yellowstone project.*—We are indebted to Schaefer & Newlon, of Fairview, Mont., for some very interesting pictures and cheering news of the Lower Yellowstone project.

Production in the Lower Yellowstone Valley can be increased 400 to 500 per cent if all the land is put under intensive cultivation. Fairview is located within 2½ miles of the geographic center of the valley and could easily support 1,000 farmers instead of 150 as at present.

*Nevada, Newlands project.*—We are indebted to friend Billy Rowles, of Fernley, a former service man, for a very attractive booklet entitled "Feed on Fernley." Just glancing at the cover page we thought Bill was inviting us to "eat." Having more than once enjoyed the hospitality and the good cooking of the hostess of the Rowles ranch, this mistake was excusable, but that does not lessen our disappointment.

The booklet very entertainingly emphasizes the resources of the garden spot of the Newlands project, and should easily convince the Nevada stockmen that as a place for winter feeding Fernley is the one best spot in the State.

Handsome half tones illustrate the text, and the booklet is a very creditable presentation of the district.

Thomas Williamson has closed a deal for the purchase of the Dan Sheckler ranch of 160 acres in the Sheckler dis-

trict 6 miles west of Fallon, the consideration being \$31,500. Mr. Williamson takes immediate charge and will move the haying crew from his farm east of town to the Sheckler place to harvest the large hay crop there. Mr. and Mrs. Williamson intend selling their nice residence property in Fallon, and in case they do, will move to the Sheckler place. However, the purchase of this splendid farm will not in the least change their plans about building a home



Fairview, Mont., farms.

A stands for Alfalfa, broad acres of wealth;

B stands for Beets, storehouses of health;

C for the Corn that fills silos with feed.

If you grow crops like these, what more do you need?

on their farm a mile west of town, where they have been putting out trees, shrubbery, and plants and doing landscape gardening for what is to be their permanent home.

*New Mexico-Texas, Rio Grande project.*—Farmers around La Mesa are jubilant over the prospects of big crops. Those already harvested have proved far beyond expectations. In the alfalfa fields, the stacks are so close together it is difficult to handle the machinery and get the

hay to the baler. Much hay was damaged by the recent rain.

The wheat fields are almost a thing of the past now, as harvesting was hurried and already most of the ground has been plowed and replanted for the second crop.

The price of cabbage this season has been rather unstable, but as a rule the price has been satisfactory to the consumer.

The price has fluctuated around \$40 to \$60, but growers have been notified to be ready to accept around \$100 a ton. The only drawback is that some of the fields were badly injured by the bugs early in the season, due to the mild weather. However, some of these fields are expected to make a fair crop of smaller and later cabbage.

At least a \$3,000,000 cotton crop in the Rio Grande Valley was predicted by J. C. Johnson, of Georgia, a prominent cotton planter of that State, who spent several days in inspecting the cotton crop of the Rio Grande Valley, accompanied by representatives of the Chamber of Commerce agricultural department. Mr. Johnson stated that the cotton of this valley is further advanced than the cotton of Georgia, and from the condition of the fields which he visited, estimated that 15,000 bales of cotton would be a minimum crop for this year.

The Bartlett pear crop is estimated at 65 cars this year; and owing to the short crop the fruit will average larger in size than most years. As a result of the careful spraying by the growers, the fruit is remarkably free from worms and will run high in quality.

Most of the crop is shipped in carload lots to eastern and southern markets, and only the fruit from small family orchards will be available for local consumption. New Orleans is probably the largest consumer of El Paso Valley pears, using from 30 to 50 cars the average season. Kansas City, Chicago, Oklahoma City, Dallas, Houston and other Texas cities also handle large shipments of local pears. Valley pears have a high reputation for quality and pack on all of the big markets, and are eagerly sought for by the large fruit buyers.

Organization and cooperation are dominating factors in the agricultural development which is taking place on the Rio Grande project. These organizations are actively engaged in promoting the production of numerous special crops for which this region is notable, and their activities are extended to standardization, grading, storing, and marketing. Associations are now profitably engaged in producing and selling cabbages, canteloupes, and other truck crops. These are pig clubs combining to make carload shipments, poultry and squab raisers, dairy organizations, and numerous others, functioning more or less cooperatively. With the large increase in the cotton acreage steps are being taken to organize the growers. A fine spirit of mutual service pervades the whole valley from Rincon to Fabens.

In climate, soil, and markets the Rio Grande project has few rivals in our country. A careful study of markets and prices covering a period of years shows a general higher

average than for most of our projects. There is more real farming to-day in this valley than ever before in its history. Our farmers here are entering upon an era of material progress, and it is only a matter of a few years when this region will attain the prominent place in the agricultural world which rightfully belongs to it. While land prices have steadily increased there has been no boom, and shrewd buyers may yet find good bargains in many parts of the valley.

#### EXPERT MARKET MAN WANTED

The Dona Ana County Farm Bureau is looking for a competent market man to handle products of its consolidated subsidiary market associations. Applicant must have plenty of executive ability, well-balanced business judgment, and experience in promoting and developing new industries, as well as new outlets for valley products.

This community is already well organized and is admirably situated for large expansion.

The salary will be commensurate with the service rendered. Write to H. H. Brook, president Elephant Butte Irrigation District, Las Cruces, N. Mex.

*Oregon, Umatilla project.*—Walter Botkin has sold his farm of 30 acres on the North Ridge to H. M. Clark for a consideration of \$13,000. Mr. Clark took immediate possession of the place, which included in the sale all the personal property. The farm consists of half fruit and half alfalfa.

*Washington, Yakima project.*—Estimates by Yakima Railroad officials place the valley's 1920 hay crop at 30 per cent more than last year, and the potato crop at 20 per cent over last season's.

Officials say that the apple situation in the lower valley, which is reported to have been harder hit by the subzero winter weather and spring frosts than any other section, is improving with the advancing season. Ranchers are much more optimistic than they were a month ago. There is more optimism now about the coming crop than there has been for the past few months.

The Sunnyside Registered Duroc Jersey Pig Club is an organization consisting of 25 members between the ages of 10 and 19. It was formed in March, 1919, and has included in its membership 25 boys.

Many of the boys were financed by the First National Bank of Sunnyside, which institution took the boy's note for the cost of the registered Duroc Jersey gilt, charging 8 per cent interest and giving the boy one year's time to pay his note.

C. de Vere Fairchild, who has orchards in the Tieton, Selah, and Fruitvale districts, reports the most promising pear crop in the past 10 years on his holdings. Mr. Fairchild is particularly pleased with his Tieton ranch, where in addition to a 100 per cent pear crop, he expects a good crop of apricots. A neighbor on the Tieton, Mr. Fairchild says, has just turned down an offer of \$2,000 an acre for 10 acres planted to peaches which show every indication of yielding a full crop this season.



*Wyoming, Shoshone project.*—That the proposed cooperative flour mill, organized and financed by about two score of our Powell Valley farmers, is to be built and in operation in time to handle this season's crop is the determination of the promoters of the new company, according to Max Addleman, a leading spirit in the enterprise. It is planned to build a small mill with machinery capable of handling a 25-barrel per day output, but this capacity may be enlarged as is needed. The proposed machinery is to cost some \$13,000, and the entire plant complete will likely represent an expenditure of approximately \$20,000.

The optimism and courage with which the homesteader in the Deaver and Cowley neighborhood are meeting the vexing obstacles incident to settling in a new country is enheartening to say the least. Success is crowning their efforts. Although not all the conveniences and luxuries the settlers in the older sections have are theirs, just now it is doubtful if any more happiness and contentment can be found in rural communities than is evident among the homesteaders of Deaver and Cowley. Many cases of outstanding success could be pointed out. B. J. Schwab, living about 4 miles north and west of Deaver, can feel justly proud of his 30-acre alfalfa field. Mr. Schwab inoculated the seed before planting last year and the fact that it is doing business was proved by the little nodules that clung to the roots of several plants dug from different sections of the field. Now, instead of extracting from the soil one of the important plant food elements, nitrogen, the alfalfa is storing night and day this important plant food back in the soil. Mr. Schwab conservatively estimates his alfalfa yield this year to be 4 tons per acre.

William Kennison, living about 4 miles north and west of Cowley, is another homesteader who points toward his 45-acre field of alfalfa with considerable and just pride. From the road one does not see the excellent growth and uniform stand this field has and not until you have waded into this nearly waist-high sea of alfalfa can you appreciate fully why the homesteader is optimistic and happy over the results of his time and labor expended on what was formerly sage and cactus. Mr. Kennison says he took time and patience with the soil and prepared an excellent seed bed and besides planted 20 pounds of seed to the acre, but it paid.

Oliver Hower is another homesteader living north of Cowley who has developed a farm from the rough to a stage of productivity. Besides having most of his land under cultivation and coming along nicely, he has begun to develop an apiary of considerable promise.

To record the examples of success to be found among those developing productive farms and founding permanent homes, made possible by the irrigation waters, would require space to fill a book. The optimism and courage of the homesteader coupled with the happiness and contentment in their homes makes a visit to the Deaver and Cowley homestead section a most interesting one.—*C. J. B.*

The slogan "Better Sires—Better Stock" urges not only purebred sires but good purebreds.

## BRIG. GEN. WILLIAM L. MARSHALL, 1846–1920.

Brig. Gen. William L. Marshall, former Consulting Engineer to the Secretary of the Interior, died in Washington, D. C., on July 2, 1920.

Gen. Marshall was a distinguished officer in the Engineer Corps of the Army, and served as Chief of Engineers from July, 1908, to June, 1910. On July 2, 1910, he was appointed Consulting Engineer to the Secretary of the Interior and served in that position until February 29, 1920, when he resigned on account of ill-health.

Gen. Marshall was buried in Arlington National Cemetery on July 3, 1920.

### AN APPRECIATION BY C. J. BLANCHARD.

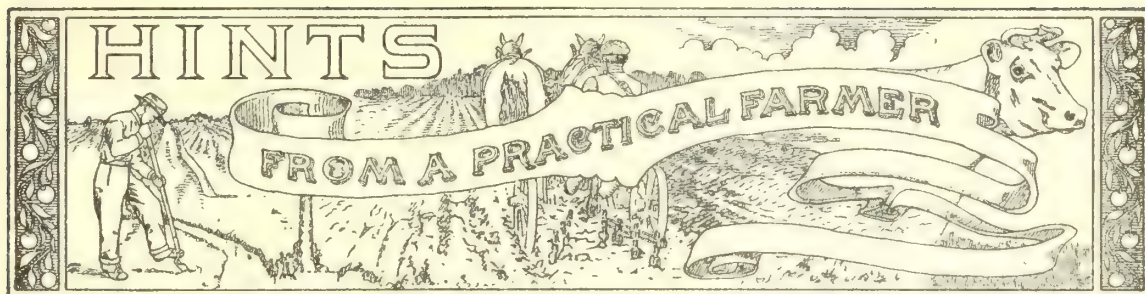
Gen. Marshall has gone West. A brave and kindly soul has passed to the unknown. It seems but yesterday he sat across the desk, his booming laughter ringing through the room. The voice that with merry quip and jocund anecdote enlivened our spirits is stilled forever. The giant form which covered the heart of a joyous child rests in beautiful Arlington, a fitting abode for one whose life work was all good.

Soldier, explorer, discoverer, builder, and inventor, his contributions to his country were varied and important. His foot prints are on nearly every western mountain top and along the courses of nearly every western river. In the days when our Golden West was the land of the Argonaut, when the prairie schooner and the pony furnished the only means of transportation, young Lieut. Marshall was scaling the dizzy heights of lofty mountains, locating the passes through which, years after, the engineers penetrated with the lines of steel. From the headwaters of the Columbia to the Gulf of California, over the wind-swept plateaus of Utah and Nevada, into the deserts of Arizona and Idaho, he led his little party of surveyors and mapped an unknown region for the coming of the miner and the farmer. On many rivers of the Middle West and East impressive structures of concrete stand as monuments to his engineering skill. His record of a whole lifetime is one of blameless construction and enduring service.

In the many years of his connection with the Service he won the admiration and esteem of every one of his associates. In the trying periods when political changes threatened the organization, his council and advice were directed toward perpetuating the high ideals and splendid esprit de corps upon which the Service is built. Our friend and fellow worker has departed, but the memory of his good deeds, his kindly companionship, and his unselfish helpfulness will never fade. In the words of Whittier:

"It may be my friend might miss,  
In his new sphere of heart and mind,  
Some token of my hand in this."

Because I know I am speaking for all his friends in the Service I pay this willing, but slight, tribute to his memory.



### Rats.

According to conservative estimates made by the United States Public Health Service on the basis of numerous surveys, there is at least one rat for every person in the United States. This estimate coincides with that for Great Britain and Ireland and with authoritative figures for Denmark, France, and Germany. The annual upkeep per rodent was computed by the same authorities as \$1.80 in Great Britain, \$1.20 in Denmark, and \$1 in France. The depredations of rats in the United States probably exceed the estimate for Great Britain. One-half a cent a day is considered conservative, but even on this computation it costs the United States \$180,000,000 a year to support its rat population. This does not include mice.

The United States Public Health Service has published a new bulletin entitled "The Rat: Arguments for its Elimination and Methods for its Destruction." Copies may be obtained by addressing the United States Public Health Service, Washington, D. C.

### Keep Young Pigs in Clean Pens.

Investigations reported in a recent technical publication of the Bureau of Animal Industry, United States Department of Agriculture, disclosed additional evidence of the importance of keeping young pigs in clean pens that have not been contaminated by other swine.

A roundworm of pigs, known as *Ascaris suum*, is held responsible not only for many deaths among swine but for a large proportion of the runts among these animals. Development and perpetuation of the roundworms is fostered by badly drained and manure-covered hog lots, which are on this account dangerous to young pigs and not good for pigs of any age.

#### SOIL MAY BECOME INFESTED.

Eggs of the parasite may remain alive in soil for five years and even longer. Places occupied by pigs harboring the adult worms in their intestines will become badly infested with the eggs. Pigs farrowed and kept in such places are certain to pick up many of these eggs, and even suckling pigs are liable to swallow eggs present in dirt adhering to the teats of the sows.

Investigations by the bureau have proved that after the eggs have been swallowed and have hatched in the intestine the young worms do not immediately settle down,

but penetrate the wall of the intestine and travel to the liver and the lungs. From the lungs they crawl up the windpipe and then down the esophagus and return to the intestine. Only after they have passed through the lungs do they establish themselves in the intestine and grow to maturity.

#### MAY CAUSE PNEUMONIA.

In passing through the lungs the young worms cause more or less damage to these organs. Pneumonia may result and the animal may die about a week or 10 days after infection. Symptoms of this pneumonia among pigs are commonly known as "thumps." Not all cases of "thumps" come from this source but the worms are frequently the cause. Young pigs are more susceptible than older pigs to infection and are also more likely to suffer severely from migration of the young worms through the lungs.

There is no treatment for the lung stage of the parasite. If the pig survives he may later be treated with worm remedies to remove the worms from the intestine. In such cases, however, it commonly happens that the animal has been so seriously injured by the worms during their migration through the lungs that even after their expulsion from the intestine the pig is unable to make up for the setback he has received, although he does better than if allowed to go untreated.

### Inexpensive Driers for Fruit and Vegetables.

For the benefit of those who wish to make their own driers for fruit and vegetables the Department of Agriculture, Washington, D. C., has published for free distribution pamphlets containing detailed information on the subject. One of the driers recommended is metal covered and is designed to stand on a cookstove or small furnace. A less expensive cookstove drier, also recommended, is made of lath, wire screen, and canvas or heavy unbleached muslin. With either of these articles much of the garden's surplus can be conserved for winter use, thus materially reducing the food bills of the coming months.

The "Better Sires—Better Stock" movement is more than a campaign for purebred sires. It is a better-sires effort, which means that, in addition to the elimination of scrub and grade sires, purebred sires must be of good quality.





When you made up your budget for the fiscal year did you include an item for vacation, a real change and rest? Get out your books and revise them so that there shall be not only a recreation fund but a vacation fund, for this is a real investment.

A prominent social economist says there is just one solution to the problem of unrest that is threatening the security of American women to-day, and that is a margin of leisure. How to obtain that margin of leisure is too much for the average farm woman, so she gives it up. On a rocky New England farm there lives a most unusual woman. She keeps the typical spic and span New England house, yet her body is strong, her mind keen and alert. "My first housekeeping days," she said, "are nightmares even to remember. My Puritan training included nothing as frivolous as recreation, and vacations were unheard of. I found after many years of studying short cuts, scientific housekeeping, and labor and time saving devices, that there was positively no place in my yearly budget for leisure, so I just put it there."

How often you hear the expression: "I can't take a vacation now, there is too much to do; besides we can't afford it, for we are trying to get a little ahead." Practice thrift by all means, but be not so keen on "getting ahead" that you let more important things pass you by. A little intelligent planning will provide for a vacation without drawing on your savings account.

August marks a turn in the road in most of our farming communities. We have put behind us the long hard days of sowing and reaping, of hoeing and weeding, of canning and drying. Just around the corner stretches a strip of road that leads us to the sheltered spots where we can rest before thrashing begins and schools open. We have rushed so hurriedly from one activity to another that we have missed a lot of things on the way. In our mad rush for money how the scenery blurs by. Flowers, trees, lakes, the river and sky, the song of birds, sunset's glow, the soft summer wind, all pass by unnoticed. Let's throw on the brakes and relax our physical energies and give our minds an inning.

It is not the actual labor of housekeeping in many cases that wears women out; it is the fact that the job is perpetual, with no margin of leisure wherein they may develop their individual tastes and inclinations. To the city

woman relief is surely coming in the form of cooperative kitchens, municipal canneries, etc., but the farm woman must look to her own resources and ingenuity. Therefore, we say, take time to rest and re-create yourself. If you can't keep your house in perfect order and yourself mentally poised, better let the house suffer than yourself. It is good to see a house spotless and shining, everything in it performing its part like a company of well-drilled soldiers, but if to achieve this result requires a never-ending round of labor which takes all the radiance and vibrancy and poise out of you, isn't it wise to choose the lesser of two evils and let things go while you keep yourself fit?

"Time was," said our New England friend, "when I couldn't look at that pile of sewing on the closet shelf without feeling driven and exhausted. Now it waits without troubling me, for I know that by the time I have taken a bracing rest away from home with multitudinous duties that are as dear as they are wearying, by the time that my brain has had its mental gymnastics amid lovely surroundings of trees and birds or by tumbling waters, my fingers will fairly tingle to get hold of those 'duds' to be mended and frocks to make, and I shall tackle it with a 'want to' attitude instead of a 'hate to' one."

If you are not a convert to the efficacy of a vacation try it just this once, and when the summer is gone you will remember it as the most beautiful and satisfying in your whole life, like a sermon that has touched the most responsive chords in your being, and you will unconsciously say "Amen."

### Reclamation Babies Win.

Just to show that our knowledge of "better babies" is gained first hand, you will be interested to know that in the better-baby contest just closed in this city, the prize for the best baby brothers was awarded to Paul and Francis Leverone.

Paul and Francis also received honorable mention in the photographic baby contest held by the Washington Post in 1918.

The proud father of these wonderful children is Mr. P. J. Leverone, of the Reclamation Service Drafting Division, Washington, D. C. Their picture appeared at No. 87 on the back page of the May RECORD.

Winning prizes is the easiest thing these babies do, and as long ago as 1917 Master Paul took second prize in the Arizona State Fair baby contest. Mr. Leverone was at that time connected with our Phoenix office.

### The Neighborhood Club.

"The Neighborhood Club, on the Newlands project, Nevada, is a live, working organization of 32 members," wrote Elizabeth Cushman, of Fallon, in a delightful letter recently.

"The organization of this club was the outgrowth of a general feeling among the farm women of our section that we needed something more in our lives than just the daily routine of farm life, although we loved that life.

"We meet every two weeks at each other's homes, and as we meet alphabetically there is never any question as to who shall entertain next. We discuss current topics, some of us take our fancy work, and we enjoy the meetings very much. It is a rule of the club not to allow any unkind remarks, gossip, or criticism to come into our conversation, which must be constructive or educational.

"The dues are 25 cents a month. The hostess is at liberty to invite guests to the meetings, and simple refreshments are served.

"The club aims to give assistance to those who need it. This month we are furnishing a nurse for a neighbor who otherwise might not have one, and the Friday Club in the district next to ours is providing her with a layette.

"Before organizing we were not a very sociable neighborhood, but since meeting in this way we have become better acquainted, have met many of the newcomers, and try to make them feel at home in our midst.

"We do not belong to the Federation of Clubs, still we feel we are eligible to mention in the RECLAMATION RECORD.

"A neighbor of ours, the Twentieth Century Club, of Reno, very recently celebrated their twenty-fifth anniversary by planting a beautiful tree in memory of the Reno boys who sleep in France. At the planting one of the club members recited the poem by Joyce Kilmer (who also lies in France) called—

#### TREES.

I think that I shall never see  
A poem lovely as a tree;  
A tree whose hungry mouth is pressed  
Against the earth's sweet flowing breast;  
A tree that looks at God all day  
And lifts her leafy arms to pray;  
A tree that may in summer wear  
A nest of robins in her hair;  
Upon whose bosom snow has lain,  
Who intimately lives with rain.  
Poems are made by fools like me,  
But only God can make a tree."

### Mr. and Mrs. Michael Strausz.

A prominent club woman of the Tieton project, Washington, has the following to say of a neighboring couple who were pioneers of the section:

Twenty years ago, the splendidly progressive city of Yakima, Wash., was just struggling out of her infancy and opening her eyes to the resources of her outlying valleys. At that time little progress had been made in the development of those districts. Even Nob Hill was only an uninteresting slope, partly set to orchard; Summit View, a rough, dusty, barren hillside; Wide Hollow a vast stretch of sagebrush; and Cowiche a neglected and forgotten valley "over the ridge."

The Tieton project was then undreamed of. The magic of irrigation as offered by the United States Reclamation Service was unknown in that section. Only men of broad and true vision could glimpse the future of all that territory if placed under irrigation.

It was in the year 1900 that there journeyed from a prosperous Missouri farm a man who somehow must have seen with a prophetic eye the possibilities of Cowiche Valley and settled there. This man was Michael Strausz, who 65 years before had first seen the light of day in Germany. At the age of 12 he had come to America with his parents, settling at Marietta, Ohio. When 22 years old he married 18-year-old Mary Fritz and together they emigrated to Shelby County, Ills., and thence to Barton County, Mo., where their family of 11 children was reared, 7 of whom reached maturity. Eventually, the entire family crossed the continental divide to the great Northwest, and all have developed beautiful orchard tracts in various places. The homes of two sons, Jacob and William H. Strausz, on Summit View are fine examples of this.

Michael Strausz was one of the leaders of the movement to enlist the aid of the Reclamation Service in bringing the Tieton project to a reality. With great interest he watched the various survey parties as they slowly and carefully located the prospective canals, listened eagerly to hear a favorable report, and patiently awaited the time when Congress should appropriate the necessary funds. At least he saw the beginning of the truly wonderful piece of engineering—the construction of the winding concrete canal which would bring the waters of the Tieton River to the fertile, sunlit, long-thirsty Cowiche Valley. In 1910 our hero, 75 years of age, saw the completion of the further task of distributing the water over what was known as the first and second units of the Tieton project. His interest did not end with that. He personally engaged in the development of a considerable acreage, and his attractive home on the main road with its orchard and lawn and flowers was an example to the newcomers who sought to make a fortune there. Mr. Strausz served as one of the first directors of the Tieton Water Users' Association, and church and community affairs were always his first interest.

Mr. Strausz and the gracious little helpmate, who has walked beside him through the 63 years of their married life, spent a few years in Yakima; but they recently retraced their steps back to the Tieton project, where every bush and vine and tree proclaims the wisdom they showed in selecting that spot in which to make a



home. Their declining years are made happy by their many relatives and friends, who hold them in highest esteem. It is an interesting fact that belonging to this household are 7 children, 32 grandchildren, and 24 great-grandchildren.

### Project Women's Activities.

Members of the Progressive Woman's Club of Fruita, Grand Valley project, Colorado, are lending their influence in the praiseworthy plan of beautifying the city park. They are circulating a petition asking that old cotton bearing trees be cut out, and that better varieties be reset. They also ask for better lawn and flower gardens, as well as improved walks. They set forth the ideal location of the Fruita Park, which with a system of landscape gardening can be made a beauty spot that will be seen and appreciated by hundreds of tourists, as well as the local residents.

The Woman's Club of Burley, Minidoka project, Idaho, had a thrift meeting a few weeks ago which was most unique and interesting. After a few brief remarks on the subject by various members came the thrift fashion show in which six little girls first appeared. They were dressed in garments made from flour sacks, and they charmed the audience by repeating little verses describing their respective gowns. Next came six older children dressed in garments made from old skirts. They sang a little song entitled, "There's a long, long tail of muslin on the back of Dad's old shirt." They were roundly applauded. Several of the young ladies of the high school then gave a demonstration of a properly dressed school girl in middie and skirt instead of georgette waist and ribbon camisole. A number of made-over garments were on exhibit. Children's underwear, rompers, dresses, and aprons attracted much attention, also a house dress in large size, made from flour sacks, the total cost of which was 75 cents.

An eastern club recently held a similar meeting at which thrift lessons were extended also to the refreshments. It is reported that the "eats" were delicious as well as economical.

The Powell Library Club, Shoshone project, Wyoming, is a club for all the women on the project, just as the chamber of commerce is for all the men. Its aim is not primarily social, but to be useful to the community. It has helped promote the summer chautauqua and the winter lyceum, but of course its most important undertaking is to build up a public library. It has purchased approximately \$100 worth of books a year, until now it has a creditable library, one that has outgrown the limited space it has been able to find from time to time. Besides equipping and maintaining this library, the club has been slowly accumulating a building fund, which will soon be used toward erecting a modest building on the lots set aside by the water users for such purpose. Cordial invitations are extended to all the women to attend the meetings of the club.

At a community meeting recently held at Deaver, Shoshone project, the afternoon was given up to a discussion on beautifying the Deaver cemetery. A committee was appointed to employ an engineer to lay out the tract in blocks and to survey the roadways. It was also decided to hold a social for the purpose of getting money for fencing, etc. An afternoon was set aside when all the men who can will be invited to help with the leveling of the tract and the fencing.

Senior girls in the University of Idaho's department of home economics have been taking a course of practical training in home management. The laboratory used is a Moscow residence loaned to the university for the purpose.

The family in this practice home consisted of five girls and two instructors, and every attempt was made to reproduce exactly conditions young women may be expected to encounter after leaving the campus. Cleaning, dusting, scrubbing, and labor in the laundry were included in the daily routine.

Each girl for a definite period superintended the house, planning and cooking all the meals, doing all the buying and paying the bills. She was required to prepare a budget and to account to the penny for all expenditures. Fifty-five cents per person per day was the maximum allowance for food.

### B'r Rabbit Beats Old H. C. L.

The Rabbit and Pet Stock Association recently put on a very attractive show at El Paso, Rio Grande project, Texas, where all kinds, sizes, and colors of rabbits were on exhibition. Several of the large breeders showed extensively and were in the hall at all times to explain the fine points in rabbit raising as applied to that climate and local conditions. The home demonstration agent displayed several ways of preparing rabbits for the table. There were fried rabbits, baked rabbits, and rabbit pies. There were rabbits in strange yet savory and attractive guises, and the exhibit created no little comment. It is estimated that there are more than 2,000 families in El Paso County who are providing wholesome meat for the table by this means. One breeder claims to produce rabbits at a feed cost of 12½ cents per pound. Put a few in your back yard. They will help reduce your living expenses and at the same time provide a delightful change in menu.

### An Excellent Investment.

Some idea of the profit in the poultry business, in a small way, may be had by the experience of Mrs. W. H. Caldwell, of Fallon, Newlands project, Nevada.

Mrs. Caldwell not only understands the poultry business thoroughly, but also keeps books and knows positively what her flock is producing. After figuring all expenses of 165 hens for one year, together with the expense of keeping 250 baby chicks up to 5 months' old, this little

bunch of 165 hens netted a little over \$500 for the 12 months.

Mrs. Caldwell uses all the modern methods and in winter months works her hens under electric lights. When you take into consideration that her grain costs her 5 cents per pound, and that she is not located near the large cities but sells her eggs to her local merchant, some idea can be had of the possibilities of this industry if properly handled.

Mrs. Caldwell can not understand why more women do not get into this pleasant and profitable business, for the work keeps them out of doors a portion of the time in addition to making them independent. She said: "Give me 5 acres of land near some good town and 1,000 laying hens, and I can show an annual profit of \$3,000."

### Some More About Money from Honey.

In a recent number of the RECORD women were urged to consider the bee industry. Read what the Nevada bee man says and think it over.

Harry Warren, the bee man, has just shipped in a carload of bee equipment and has already placed bees in 200 hives and figures on about 700 this year. These have been pretty well scattered over the Newlands project, usually on dry sandy knolls that are worthless for anything else. The bee industry has been given considerable attention in this valley for a number of years, and carloads of the finest honey are shipped out every season.

The bee man says that if enough bees were provided to gather all the honey of Lahontan Valley it would be worth as much as the entire alfalfa crop. He may be correct, and if so it would be some honey, for the alfalfa crop the past year is estimated to have been worth about \$1,000,000.

This appears to indicate that some one is letting a very valuable crop go to waste every year. Honey on the Government projects is gathered largely from alfalfa, which blooms almost constantly, and it is said the honey gathered from it is unsurpassed in quality.

### Reclamation Record Cook Book.

When Sir William Willcocks, the famous English engineer, visited this country a few years ago to inspect some of our larger engineering works, he presented Mr. C. H. Fitch, then project engineer, with his favorite recipe.

SIR WILLIAM WILLCOCKS'S RECIPE FOR CURRY.

(Presented by Mr. C. H. Fitch, Chief Clerk, U. S. Reclamation Service.)

Take one or more moderate-sized onions, according to taste, and after chopping them up, reduce to paste with mortar and pestle or fine food chopper. Melt tablespoonful or more of butter in frying pan; take from fire and add onion and three or four tablespoonfuls of some good curry powder, such as Cross & Blackwell's. Then replace over fire and cook short time.

The secret of success depends upon cooking this just right. If taken off the stove too soon it is raw, and if cooked half a minute too long it is ruined. The right time can be learned only by experience and is detected by the odor. When completed this is to be added to some meat or vegetables to be further cooked.

2213—20—3

#### RAW POTATO CAKES.

(P. A. Rosendorn, Drafting section.)

2 cups grated raw potatoes.  
1 egg.  
1 tablespoonful flour.  
Seasoning to taste.

Drain water from grated potatoes; mix well with the egg, flour, and seasoning; make into cakes and fry slowly in deep hot grease until thoroughly cooked and browned. One small onion may be grated or ground with the potatoes if desired.

#### APPLE SAUCE CAKE.

[Geo. A. Ward, Legal Section.]

2 cups apple sauce.	1 teaspoonful cloves.
1 cup butter.	1 of cinnamon.
2 cups sugar.	1 of salt.
3½ cups flour.	1 nutmeg.
1 cup raisins.	2 small teaspoonfuls of soda.
½ pound nut meats (English walnuts).	

To 1 cup of apple sauce add the sugar, butter, nutmeg, cloves, cinnamon. To the other cup of apple sauce add the flour, raisins, salt, nuts, and soda. Combine the mixtures and bake in slow oven.

#### PARKER HOUSE ROLLS.

Boil 1 pint of milk and add 1 tablespoonful sugar. Cool, then add ½ yeast cake, 2 tablespoons butter, 1 teaspoon salt, and flour enough to make soft batter. Let this rise one hour. Knead well and let rise until very light, then roll out about ½ an inch thick, cut out with cookie cutter, butter top, and fold together. Let rise again and bake in hot oven about 10 minutes.

#### PEPPER SAUCE.

[Miss G. M. Athey, Engineering Division.]

1 dozen green peppers.  
1 dozen red peppers.  
1 quart onions.

Put these through food grinder with coarsest knife. Put in kettle with enough cold water to cover and 2 tablespoonfuls salt. Bring to boil slowly and boil five minutes. Drain through colander, add 1 quart vinegar, if mild, or 1½ pints if strong, and ½ pint of water, 2 cups of sugar, 1 teaspoonful salt. Boil 15 minutes. Celery seed may be added if desired.

#### DATE PUDDING.

[Mrs. Jennie T. Davis, Bookkeeping Section.]

1 cup chopped walnuts.	1 scant cup sugar.
1 cup seeded dates.	1 teaspoon baking powder.
2 eggs, well beaten.	1 tablespoon flour and pinch salt.

Bake 35 to 40 minutes in slow oven.

### The Death Sentence.

Pronounce the death sentence upon every fly that comes into your house. Whenever you drive one out it only perches itself on or near the screen and waits for the first chance to slip in again, or worse, it hunts some breeding place, and as a result a thousand flies are soon swarming around your own or someone else's door.



The swatter is quite effective for the stray fly, but in damp weather, or when many persons are opening the doors, a large number of flies are liable to congregate daily in your house. Here is a very effective method of finishing their careers:

Darken all the house but the kitchen, and in a surprisingly short time most of the flies will hasten to that room, then close the kitchen door and darken it also, leaving a small space at the bottom of the shades. The flies will flock to the light places. Now sprinkle a generous amount

of pyrethrum powder where the flies will be likely to light, then leave the room tightly closed for a couple of hours. At the end of this period open the door and sweep the flies up and burn them. The pyrethrum powder does not kill the flies, but stupefies them and they drop wherever they come in contact with the powder and seem dead until they are revived by fresh air. The powder is not harmful to a person entering the room where it is sprinkled.—L. L.

## THE GRAND CANYON DEDICATION TOUR.

### With Comments on Reclamation Projects.

By Beatrice M. Ward, National Park Service.

At 10.05 p. m. Thursday, April 8, the Brooklyn Daily Eagle special train pulled out of the Pennsylvania Station at New York City on its Grand Canyon National Park dedication tour. The principal objective of the party, of course, was the dedication of the Grand Canyon as a national park, as it was organized to attend these ceremonies at the invitation of the Department of the Interior.

We stopped at Charlottesville, Va., Chattanooga, Tenn., New Orleans, Jennings, and Sulphur, La., and Houston, San Antonio, Marfa, and El Paso, Tex., on our way to Miami, Ariz., from where we started over the Apache Trail. In every one of these towns we were splendidly received by the chambers of commerce and were shown many interesting and absorbing things. I would like nothing better than to write a detailed account of our visits to each, but it will be impossible in this article to do more than describe our experiences in the national parks and reclamation projects.

Just a week after leaving New York we reached Miami. Before beginning our drive we were conducted through the well-known Miami copper mines and smelters. Then began a day the memory of which time will never eradicate—a drive over the noted Apache Trail, of 120 miles through a marvelous and spectacular country. The road winds through high-walled canyons, over precipitous mountain ridges, and along the edge of cliffs which fall hundreds of feet below. Many varieties of cacti grow along the trail, among them the giant cactus, and some of the mountains, from a distance, seem to be covered with it. The scenery all along the trail is awe-inspiring, with its majestic mountains on either side, its gorgeous wild flowers which grow in abundance, and blossoming shrubs. Soon, far below the trail, one catches a first view of the wonderful Roosevelt Lake, with water the color of a sapphire. The lake, which is about 20 miles long and from a mile to a mile and a half wide, is formed by the Roosevelt Dam. For miles, high above, we closely followed this artificial body of water. As the Roosevelt Dam is approached the ruggedness of the mountains becomes more apparent.

At last we reach the dam, located in the Salt River Canyon just below the mouth of Tonto Creek. Its pur-

pose is to regulate the flow of the Salt River. When needed the water is permitted to flow down the river channel from the dam for 40 miles and is then diverted by the Granite Reef Dam into two canals, each carrying the water to the irrigable lands. We were told that the crest length of the Roosevelt Dam is 1,125 feet, its height 280 feet, and its width on the top about 16 feet. We were also told that the present Director of the Reclamation Service is responsible, in a great measure, for the design and construction of the dam. It will stand for centuries as a monument of honor to his memory and the memory of the others who participated in designing and constructing it. The reservoir, which has an area of 16,832 acres, and a capacity of 1,365,000 acre-feet, furnishes water to make more than 200,000 acres productive of crops which, last year, we were advised had a gross value of about \$126 per irrigated acre. In proportion to area this project surpasses any other place on earth in the production of cotton and alfalfa and it produces corn, rye, oats, barley, wheat, vegetables, and fruits in abundance and of excellent quality. The cotton is a long-staple cotton of the finest quality. It is developed from seed imported from Egypt and is called Pima cotton. The live stock are well kept, as are the houses, barns, and other buildings. There is connected with the Salt River project a hydroelectric power system which furnishes current to Phoenix for lighting and street-railway purposes, and also to many mining industries in the vicinity. We were informed that the receipts from the current are sufficient to pay all the expenses of the project, including the cost of the supply of water to the landowners. We were also told that all public land in the project has been filed upon and that land can now be obtained only by purchase from its owners. Many of the large farms are being cut into smaller holdings and sold, thus bringing new people into the valley. For some miles before reaching Phoenix we saw many of these farms, splendid examples of the wonderful results following the construction of the Roosevelt Dam.

From Phoenix we went on to Tucson, Ariz., and motored from there to the Casa Grande National Monument by way of Florence. From Casa Grande we proceeded to Calexico, Calif. Unfortunately we passed through the

Yuma project at night. However, we were told by people familiar with this project that the Laguna Dam crosses the Colorado River at a point 10 miles above Yuma and is nearly 1 mile long. It is a diversion dam and is capable of supplying water sufficient to irrigate 110,000 acres. The soil of the project is of a rich character and very productive. The principal crops are alfalfa, hay, milo maze, corn, wheat, and barley. Cotton is also raised, as are fruits and vegetables.



Exercises at Powell Memorial. Stephen T. Mather, Director, National Park Service, speaking. Inset: Miss Beatrice M. Ward.

At Calexico we walked over into Mexicali, but were unable to see anything of the Imperial Valley, as no automobiles were available owing to the shortage of gasoline.

Our next stop was at El Centro, Calif. Here we drove through sections of the Imperial Valley, the largest irrigation project in the United States, comprising about 500,000 acres. In passing various farms we noticed that the soil is silt—river deposit—in character and very productive. Melons, cotton, and alfalfa are the principal

crops and grow in abundance. Kaffir corn, wheat, and barley are also produced. If the proposed All-American Canal is constructed, upward of 400,000 acres additional, mostly public land, may be watered. The land that is now irrigated is furnished with water diverted through the Imperial Canal from the Colorado River on the international boundary line west of the Yuma project. The canal passes through Mexican territory, and reenters the United States some distance west from the diversion point, at or near Calexico. The diversion works are controlled and operated by the Imperial Irrigation District, a California corporation, and that part of the canal in Mexico is controlled by a Mexican corporation and the Imperial Irrigation District through a cooperative arrangement. It is intended that the All-American Canal shall be constructed wholly through United States territory, and that it shall receive its supply of water from the Laguna Dam on the Yuma project, or from the Colorado River in that vicinity.

Having made quite a good survey of the Salt River project, heard much about the Yuma project and its productiveness, and seen considerable of the Imperial Valley, although irrigation water is not being furnished to it by the United States, I am surprised that more farmers do not settle on irrigation projects where they can obtain water, when needed, sufficient to produce crops. If I ever become a farmerette, an irrigation project for me.

On our way to San Diego we passed through the astounding Carriso Gorge, a marvelous feat of engineering and a ride around and through magnificent and picturesque mountains. For a scenic, seemingly hazardous, ride by train this one can not be surpassed anywhere.

On our way to Yosemite National Park we visited San Diego, Santa Barbara, Del Monte, and San Francisco, with a trip to Muir Woods National Monument from the latter city.

Yosemite National Park is undoubtedly one of the most beautiful of America's great playgrounds. The drive from El Portal to the Valley is more like a dream than a reality, with its glimpse of Bridalveil Falls, the Ribbon Falls, Cathedral Rocks, Cathedral Spires, El Capitan, a formation 3,604 feet high and said to be nearly twice the size of Gibraltar, Eagle Peak, Sentinel Rock, and the famous Half Dome and North Dome. We saw the lovely Mirror Lake, Happy Isles, Vernal Falls, and caught sight of the Glacier Point Hotel 'way up on Glacier Point. From the trail to Columbia Point I also had a close view of Yosemite Falls, the greatest in all the Sierras, and of Indian Canyon, used by the Indians of long ago as an entrance and exit for Yosemite. We drove to the Mariposa Grove and saw the wonderful redwood trees. They are of a cinnamon-red color and the leaves are needlelike in form. The snow prevented us from going higher than the Grizzly Giant, but this tree alone is worth the trip. It is the largest tree in the grove—93 feet around at the base, 29 feet in diameter and 204 feet in height. The snow here was between 2 and 3 feet deep and many snowball fights added much to our pleasure. We left Yosemite, already dear to us, each



longing to go back and spend weeks exploring every nook and corner.

Continuing our journey we stopped at Los Angeles, Pasadena, and Riverside, and drove across the San Bernardino Mountains to Cajon, from which point we proceeded by rail to the Grand Canyon National Park.

We were a restless, uneasy group of people as our train pulled into the park—three hours late—all eager for a glimpse of this vast and amazing gorge. The canyon is 217 miles long and from 9 to 13 miles wide. This wonderful spectacle seemed to affect us differently, some were silent, others desired to get away from the rim as quickly as possible, and from still others we heard many exclamations of astonishment and amazement. From the rim one catches a glimpse of the Colorado River, which appears to be a narrow and very calm stream, on either side of which rise stupendous masses of granite carved in all imaginable forms and painted in all the colors of the rainbow; but upon descent into the canyon it was found to be a dirty, mud-colored, turbulent, roaring river. Among the interesting trips we made were the drives over the Rim Road and to Grand View and Desert View, the latter affording a fascinating glimpse of the Painted Desert to the east, and trips over the Hermit and Bright Angel Trails. The second day of our stay, April 30, was Dedication Day. In the afternoon there was a pilgrimage to the Powell Memorial headed by a brilliantly arrayed group of Hopi Indians and by Father Vabre, of the Franciscan Order. Hon. S. T. Mather, Director of the National Park Service, presided at the exercises at the Monument and addresses were made by Father Vabre, Col. H. C. Rizer, Mr. Frank C. W. Pooler, Mr. C. D. Mahaffie, Mr. Edward M. Bassett, and Dr. Geo. Wharton James. The evening exercises, at which the actual dedication took place, were held in El Tovar and Mr. Mather again presided. Governor Campbell, of Arizona, made the principal address, followed by Mr. Meier Steinbrink, who formally dedicated the canyon. Other addresses were delivered by Col. James W. McClintock and Mr. Mather, who paid a glowing tribute to Maj. John Wesley Powell, the discoverer of the Grand Canyon, and the Father of Reclamation, in whose memory the National Park Service erected the monument within the park. Secakuku, the next chief of the Hopis, delivered an address in his native tongue and then led seven of his people in a prayer chant. The program was concluded by four remarkable Hopi Indian dances around an enormous fire in front of El Tovar. An informal dance followed in the music room of the hotel. We left the canyon the next night, carrying with us a vivid remembrance of the greatest wonder of the world, an enchanting, dazzling, and unforgettable spectacle.

We arrived in New York, Saturday, May 8, greeted by rain, something we had not seen since leaving the East, with a keen sense of regret that the most wonderful tour ever was over, each firmly resolved that the next Brooklyn Eagle trip would not find him among the missing.

## NEED OF LAWS AND REGULATIONS GOVERNING DELIVERY OF WATER FROM MONTANA STREAMS IN ACCORDANCE WITH RIGHTS OF PRIORITY.

By G. A. Benjamin, Irrigation Manager, Sun River Project, Mont.

During the past two or three years Montana has had an awakening regarding the great good than may accrue to her through scientific irrigation. For a number of years, say from 1911 or 1912 to 1916, farming in the State gravitated toward the dry-farming system which required a comparatively small outlay, yielded excellent returns if conditions were favorable, and served to stimulate the cultivation of additional acres of raw land. Irrigation during those years was considered a superfluity and maintenance work on systems, large and small, was to a considerable extent neglected. But the history of the past three years has proved that farming in Montana without irrigation is not dependable. Those of us who always have believed in the efficiency of the application of water to growing crops in Montana as well as in other sections of the West naturally feel elated at the prospect of Montana joining the sisterhood of Western States as an active and enthusiastic member.

If Montana is to practice scientific irrigation, increase her irrigated areas, and utilize to the greatest extent the vast quantity of water stored annually in her mountain gorges it will be necessary to modify her laws and regulations regarding irrigation. It is not the purpose of this article to go into detail regarding certain specific weaknesses. It is proposed to discuss poor irrigation practices with a view toward further discussion and the suggestion of corrective measures. Good irrigation laws and regulations are matters of growth. It is a long reach from the early laws in Colorado that served the purpose under primitive conditions to those which to-day regulate the conserving of water in her vast storage reservoirs and the distribution from her numerous common carriers.

It is not to be expected that rights will be wholly respected unless the strong arm of the State takes the matter in hand and wields the big stick. It is recalled that a certain tract on one of the important rivers of Montana having a water right on file dating back to 1881 was deprived of water for irrigation comparatively early in the season. After much delay and irreparable loss it was found that holders of more recent rights and some without any rights on file whatever were diverting the water along the upper stretches of the stream to irrigate native hay meadows. Due to lack of knowledge of procedure and other delays the rightful owners were deprived of water during the balance of the season, thereby losing valuable crops which financially embarrassed the company. Another case occurring on a sizeable stream is that of a certain large water user respecting prior rights by leaving a certain quantity of water for divergence and use a number of miles below. Before reaching the point of diversion the holder of a right in the river without any priority whatever

opened his headgate and helped himself to the water he needed during the entire period of water shortage. The procedure in such cases is to serve notice upon a person thus unlawfully diverting water, after which if the practice is continued application may be made to a court, which appoints a referee to take charge of the deliveries on the stream. It may be contended that a writ of injunction can be secured to protect the rightful owners and that the laws of the State are adequate, if put into effect, to secure damages against persons unlawfully using water. However, such procedure puts the burden of proof upon the wrong person and is a poor working tool for a water user at a time when his crops are endangered by drought.

The State should have charge of the distribution of water from the streams through efficient officers clothed with adequate authority. It is not absolutely necessary that such officers should be highly technical men. In older States like Colorado very efficient officers for this line of work have developed among the employees of the various ditch companies or among the water users themselves. Commissioners districts are generally formed with the idea of embracing the territory easily accessible from a common point, and may take in two or more contiguous river valleys or an irrigated section that depends on a common source for its water supply. In creating water commissioners districts the best results can probably be secured by steering clear of the idea of local management. The commissioner should be an appointee of the governor, but in general it is advisable to give the county commissioners within the district authority to submit names of competent persons to the governor from whom the appointment must be made. In the State of Colorado the diversion of water for irrigation and storage is wholly under control of such officials, and the act creating the offices and defining the duties of the commissioners has proved to be one of the most beneficial acts ever enacted in the State.

There is, however, a law in force in this State that is decidedly weak in fostering the development of irrigation. A company, district, or user having an adjudicated right to a certain number of second-feet of water upon which it has filed for a specific purpose may neglect its management of the system to such an extent that operation is entirely suspended. A severe flood may undermine its headgate or a cloudburst damage its banks so that a considerable expenditure is necessary before operation can be resumed. The project is temporarily abandoned. One, two, three, four, possibly six years pass and nothing is done. But how about the water right? Does it lapse? Are the owners of the later rights benefited or can a new company file, construct a system, and bring virgin soil under irrigation? The State says in effect that as long as it is in the mind of the holder to repair the system and resume operation the project is not abandoned. A reasonable time should be given in which to repair the damages and begin operation or dispose of their holdings. Otherwise pass it along. In some of the Western States the law allows three years and in others five in which to recon-

struct the system and begin delivering water. The Montana law tends to discourage rather than encourage irrigation, and that condition prevails at a critical period in the history of the State—a period that should be characterized by development and progress rather than by delay and inaction.

This State has also failed to take cognizance in any way of waste water. So far as I know, there is no law against wasting water, or at any rate there are thousands of acre-feet wasted every year and it is generally taken as a matter of course. The only time I ever saw a man get the right kind of calling down for wasting water in this State was when the county commissioners came out from the county seat in a high-powered car to view the roads and got stuck in a fair-sized swamp caused by overirrigation. The person that caused the quagmire was irrigating in a field near-by and the compliments he received from that party of officials were really amusing. Nevertheless, I dare say he is wasting water in the same old hole. The very system under which water is secured for irrigation purposes in Montana tends to create waste. Wyoming and Idaho endeavor by law to obtain the greatest possible benefit of the water within their confines. The Wyoming law states that 1 second-foot continuous flow is sufficient for irrigating 70 acres, and Idaho allows 1 second-foot to 80 acres. In Montana such an amount is filed on as the owner can make beneficial use of. The user naturally thinks that some one may attempt to deprive him of a portion of his supply and accordingly makes it sufficiently large. He next attempts to crowd 10 second-feet through a 5 second-foot ditch, which results in wastage before the water has traveled a hundred yards in the conduit. Who is to determine whether or not beneficial use is being made of the water? Why not make that a duty of the water commissioner and enact a law stringent enough to put a stop to the deliberate waste of water? Under one of the oldest ditches on Sun River so much land has been waterlogged by the continuous flow system of delivery that the landowners are anxious to have some one—preferably the Reclamation Service—construct a system of drainage. Overirrigation has done incalculable harm in the West, and is being considered more and more every year to be a menace. I mention overirrigation in this particular because overirrigation is a useless waste of water. In irrigating steep hillsides and on tracts so located as to permit very short runs there is often considerable wastage by users, but ordinarily a great deal of waste of this character is unavoidable.

Nearly all the older rights in the State deliver water on the continuous-flow basis. An allowance of 1 second-foot to 80 acres, assuming that the irrigation season is for a period of 6 months, amounts to  $4\frac{1}{2}$  acre-feet per acre. Under the system of delivering water upon demand the amount actually used per acre varies from 1 to a fraction over 2 acre-feet per acre irrigated. The Reclamation Service has adopted the latter system and is convinced of its efficiency. Yet when it comes to the period of greatest demand for water in a season the Service is on the same basis as those diverting water continually, although the



latter may have had as much delivered per acre prior to the peak of the season as the Service will deliver in an entire season. Is it not poor irrigation practice to put both systems on the same basis? Should not the system that is making the greatest possible use of the water be given a comparatively larger quantity during the period of maximum demand? The trouble in this particular is that the second-foot is made the yardstick for determining all decrees and inasmuch as different classes of soils require varying amounts there would be complications if placed on the acre-foot basis. As the practice of irrigation in the State increases and water becomes more valuable I believe some method should be and will be devised to put a premium on its economical use.

A few years ago on Snake River, in Idaho, the construction of a large dam for irrigation purposes put out of commission a water wheel located a short distance above the dam by destroying the current that operated the wheel. Although the owner was offered what was considered a fair settlement, he refused, took the case into court, and lost. In rendering his decision the judge stated, in effect, that inasmuch as the new system would be of incomparably greater benefit to the State and was indispensable to so many more people, the water wheel would have to go, and the owner must provide other means to lift the water he wished to use for irrigation. Montana also has her water wheels and some of them have decreed rights for hundreds of second-feet of water with which they are operating at a very low efficiency. The State should at least insist upon a certain standard of efficiency in operation. Think of 250 second-feet set aside to operate a set of turbines that lift 4 or 5 second-feet of water. Two hundred and fifty second-feet at 1 second-foot to 80 acres would properly irrigate 20,000 acres upon which the crops, figured on the basis of returns on the Sun River project this year, would in one season be worth \$850,000. The lamentable feature of using water for power lies in the fact that in so far as irrigation is concerned the amount of water thus used is generally lost to the State forever.

Montana is young in the matter of water storage. As time goes on and many more of the fertile acres of the State are brought under irrigation, complications regarding storage and storage water will arise, all of which will require laws and regulations to handle justly, practically, and efficiently. All lines of human endeavor of any importance are alert regarding the laws enacted protecting and fostering their interests. The stockmen are keen regarding any matters the lawmakers may discuss concerning stock; the bee men are on hand with laws protecting the bee industry; the insurance fraternity are active; and even the farmers are beginning to organize and demand laws relative to agricultural matters. It is believed to be not only within the province, but is also the duty of those most closely connected with irrigation practices and who are the best qualified on matters pertaining to irrigation to act cooperatively on conservative and progressive measures for the promotion and betterment of irrigation.

## THE STOPPING OF SINK HOLES IN CANALS AND THE CONSTRUCTION OF DROPS IN VERY LIGHT SOIL.

By C. J. Moody, Engineer, Flathead Project, Montana.

The Flathead project, Montana, has a variety of soils, ranging from coarse gravel near the Mission Mountains to fine silt on divisions lying farther out in the valleys. The silt soils are white, with little cover of loam, due to the scant growth of vegetation under natural conditions. This soil has been classified as "rock meal" by the United States Geological Survey and is the result of the glacial period followed by a period when the valleys were covered by water, being a part of the prehistoric Lake Missoula.

With the first operation of laterals constructed in the silt soils, troubles began from sink holes or breaks through the bottom of the ditches. Some of these holes extended vertically into the ground and apparently had no outlet and others dropped for a few feet and then found an outlet underground across adjacent fields, causing a caving in of the ditch banks and the topsoil of the fields for varying distances up to several hundred feet. The width and depth of these cave-ins varied from 2 or 3 feet to a maximum of 15 feet deep and 30 feet wide. Where the holes dropped vertically without breaking out in the fields it was found best to allow water to run into the hole for a considerable period, as it would generally plug itself and fill up with water, after which necessary repair work consisted in bringing the banks and bottom up to grade with team forces. When the breaks started out across the fields it was necessary to shut out the water from the break to prevent more damage to the lands. In some cases the relocation of the lateral was the most economical solution of the repair work, but generally the break in the bank was trimmed down so that the new dirt was placed against sloping sides and topsoil used as much as possible in the new bank. Water was kept in the ditch as much as possible during the time of repairing in order that the new material might be well puddled in.

The largest number of sink holes appeared during the first and second year of operation, but are still occurring with less frequency after four years of operation. They also occur in fields where irrigation water is applied. An explanation for the cause of these holes is that the subsoil which lies in horizontal strata has contracted during the drying-out process following the time when the country was a lake bed, and vertical cracks have been formed. When the light soil covering the stratified material becomes saturated sufficiently, water breaks through into the cracks and carries considerable quantities of the soluble topsoil into the crevices. Some of these must go to a great depth vertically, and others are cut off by a horizontal stratum and are open for a considerable distance parallel to the surface of the ground.

The repair of these breaks in level country is not a serious matter but for the fact that they are very numerous. It





has not been uncommon to have 20 or more in a mile of ditch, breaking in succession as soon as preceding ones are repaired and water again turned in. A more serious type of these appeared in the Camas A Canal between miles 8 and 10 where the location is on steep sidehill with light topsoil with the excavation cutting into the stratified subsoil. The first water taken into this canal dropped into cracks in the bottom in a multitude of places, went down vertically from 5 to 15 feet and came out through the hill below the bank sometimes 40 feet lower than the canal grade. As the stratified material does not cut badly it was possible to turn out the water in the canal before these holes had assumed much area. A part of the season of 1918 was spent trying to repair these holes by refilling with good material immediately after the break occurred. Shooting the hole with low percentage dynamite and then puddling with good material was also tried. Dirt in sacks in the bottom of the hole with good puddled material on top was another method. None of these proved capable of holding even under a very small head of water. It was found necessary to allow a considerable head of water to run through the break until a hole 6 or 8 feet in diameter had been cut through the subsoil and all of the cracks leading into the one which had caused the break were cut out. These holes were generally at such depth under the canal bank that the bank did not fall. The first step in the repair work was to trim the sides of the opening to as flat a slope as possible without moving much material. This slope was generally about 1:1. The canal bank, which was largely sandy loam and clay material was caved down into the opening. Sandy loam was available fortunately on the upper side of the canal and was used in filling the break. Water was kept against the new bank during the process of filling and was turned through the canal as soon as the repair work was completed. Up to January, 1920, none of the places repaired in this manner had broken the second time. During the fall of 1918 a large number of breaks were repaired in this manner. In 1919 on this canal there were 12 breaks in April, 6 during May, and 1 in July. One new hole showed up in the spring of 1920. In the repair of the later breaks, after water had been run in the canal for several months, it was noted that cracks in the stratified soil were closing apparently from the swelling of the material which was absorbing moisture from water running through the canal. This is believed to be the permanent solution of the situation.

In addition to the troubles on account of sinkholes there has been great difficulty holding structures in the light soils, especially on the Camas division. This has been most marked with vertical drops on account of the greater difference in head above and below the structure in a short distance. Concrete structures appear to give more trouble than wooden ones of the same type, are more difficult to repair, and are liable to more injury from failure. From experience in the light soil of the Camas division it is advisable to make the first installation of structures in

this kind of soil of wood. If desired to have concrete structures, they can be placed when the wooden ones have rotted out and probably would prove satisfactory as there is a great change in the soil and its resistance to erosion by water after it has been wet and settled by seepage from water in the ditch.

The type of concrete vertical drop which was built was designed to use as little concrete as possible on account of the long haul for all of the material used. (See fig. 1.) The upper wing walls and cut-off walls extended straight into the banks of the ditch at the head of the drop and were beveled off at the lower outside corners corresponding to the side slopes of the ditch. These structures failed repeatedly, the break occurring under the cut-off walls at the beveled corners. They have finally been made secure by adding sandy gravel to the clay in puddling, and by placing a large percentage of sand and gravel next to the concrete wall, above the structure in the sides and bottom of the ditch. This material prevents shrinkage

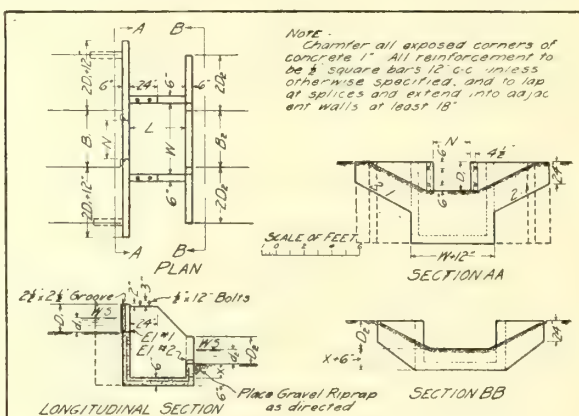


Fig. 1. Typical vertical drops, Flathead project, Mont.

cracks from forming next to the concrete. It is advisable, as shown by dotted lines in figure 1 to change the design of this structure so that the cut-off walls run down to the bottom of the pool the full length of the wing walls, with additional cut-off walls at right angles extending upstream near the ends of the wing walls.

The common type of chute drop is more secure if built with an approach and double set of cut-off walls. The use of concrete slabs in these structures, with longitudinal reinforcing of steel bars, is much more reliable than grouted paving. The grouted paving drops often fail from washing out of the foundation which occurs if there is even a very small leak through the structure. The concrete slabs will hold up under such conditions unless badly undermined and are easier to keep free from leaks. The use of elastic cement on cracks in concrete in flumes, lined sections, and chute drops has been very effective in preventing the small leakage which often is the cause of settlement of the foundation or sliding of steep slopes. One good application will last several seasons.

Cut-off walls placed in trenches have proved more reliable than when formed to the bottom and puddled in. The latter method has been common practice when standard forms are used in construction of many structures to the same design.

The standard type of concrete pipe turnout for laterals and farm deliveries was installed on the Camas division and proved unsatisfactory on account of the unequal settlement of the concrete end walls and the concrete pipe in the barrel. This caused the breaking of the pipe which entered the end walls in a large majority of the turnouts. Later construction had wooden end walls and concrete pipe barrels and has been more satisfactory on account of the flexible joint between the pipe and the end walls. Well made concrete pipe will go through a failure of the structure without breaking and be in condition for replacement. Leakage in the joints of the pipe has given trouble in new banks. This is due to settlement or lack of sufficient concrete in the collars placed over the joints. Better results would be obtained by using a straight wooden turnout with future replacement with the concrete type, if desired, after the banks are well settled as would be the case by the time the wooden structure had become rotted out.

Straight wall checks and weirs, without support on either side except from paving or riprap, have been hard

to maintain. These wash out under the cut-off walls and around the ends and have a tendency to tip over. Paving or riprap below the structure is not a substantial support especially if the bottom of the ditch below cuts out on account of too steep grade. Brackets placed on the downstream side about half way between the opening and the end of the wall give support and prevent washing out around the ends. Oversize gravel placed between the brackets and on the sides and bottom of the ditch below make better riprap than large square or angular stone and are often more economical to place. If the cut-off walls extend 2 feet or more below the grade of the ditch, cutting under can be remedied by using sand and gravel with the clay in puddling, with a liberal amount of the sand and gravel on the surface of the ditch. The brackets mentioned should extend down to the bottom of the cut-off walls. The amount of gravel riprap needed will depend on the capacity of the ditch and can be added to during operation if not sufficiently supplied at first.

The process of puddling in light soils differs from that in heavier clay or gravelly soils. It is not sufficient to throw the material into water or simply to throw water on layers of the material. The puddle must be worked somewhat after the manner of placing wet concrete in order to get it well wet, the air removed, and the material compacted.



CAMAS "A" CANAL, MILE 9, SHOWING OPENINGS THROUGH SIDEHILL BELOW CANAL.



Dry tamping is not successful. The best of puddling will shrink and crack if allowed to dry out and for that reason the puddling of new structures ahead of the time when water is run in the laterals is of no value. If it were possible to place all lateral structures after water can be

run in the laterals the work would be more economical and satisfactory from the standpoint of operation and maintenance. At least the puddling should be postponed until water is running in the ditches so that it may be held against the puddled material until settled.

## TEST OF BEARING CAPACITY OF ROCK AT IRON CANYON DAM SITE, CALIFORNIA.

By H. J. Gault, Engineer, U. S. R. S.

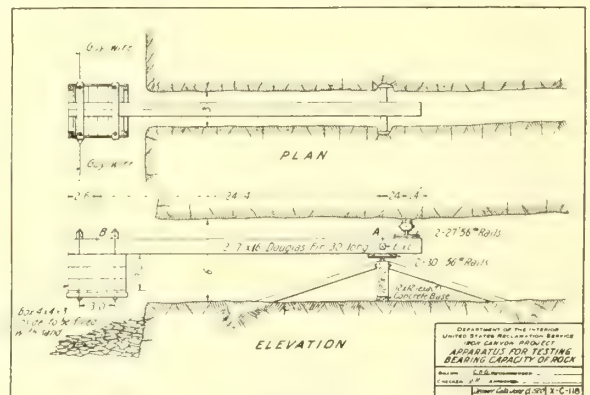
The site for the Iron Canyon dam on the Sacramento River is located in a region where the rock formations are all of volcanic origin. These include tuffs, breccias, agglomerates, and basalts. Of these classes the one most suitable for foundations for a dam is the agglomerate, and the location of the dam site was governed mainly by the consideration of finding a place in the canyon where this formation is of sufficient thickness under the river to provide a safe foundation. At the site selected the agglomerate lies in a nearly horizontal sheet or bed about 140 feet thick, of which about 110 feet is beneath the river bed.

This rock is composed of volcanic sands, ash, and large and small fragments of lava, mixed and cemented to form a sort of natural concrete of varying hardness. In drilling this material with a core drill few samples were obtained except from the lava blocks, the body of the mass being generally too soft to produce solid cores. There is no stratification or regularity in the formation, the softer parts occurring in irregular masses or pockets. For the purpose of examining this rock more closely a drift or tunnel was excavated into a cliff near the dam site. This tunnel was about 3 by 6 feet in size and 35 feet in length. It penetrated both hard and soft material, the latter in places being soft enough to be excavated by a pick without blasting.

Before planning a high masonry dam to rest upon this agglomerate rock it was desirable to know its bearing capacity or supporting power, and to this end a test was made in the tunnel by applying varying degrees of pressure upon an area of 1 square foot on the floor of the tunnel at a point where the softest material was found. The apparatus for making the test consisted of a simple beam or lever 30 feet long bearing on the roof at one end, with a weight applied at the other. The short arm was 2 feet and the long arm 24.4 feet. Concrete blocks 12 inches square and 3 or 4 inches in depth were molded on the roof and floor at the points of bearing. The beam was of Oregon fir, 14 by 16 inches, formed by two pieces 7 by 16 inches bolted together. The weight used was a wooden box 4 by 4 by 3 feet inside, filled with sand. Short sections of 56-pound steel T rail were used in combination with 12 by 12 inch pine blocks to concentrate the pressure at the proper points on the beam. In the joints between the wood and concrete blocks at the roof and floor steel pointers were inserted, extending out about 3 inches to a vertical graduated scale attached to a frame fastened to posts which were set farther back in the tunnel so as to be unaffected by the application of pressure. By this arrangement a

movement of the pointers along the scales would indicate the yielding or compression of the rock.

As a check on the results levels were carefully taken on both roof and floor blocks before and after the test. Five readings were taken on each block and referred to two bench marks before the test and another set of readings at the same points was taken after the test. These level readings showed no measurable settlement or compression at either block. The indicator at the floor block, however, showed a settlement on the scale of one-eighth inch. This result was discredited for the reason that the arrangement of the indicator was such that the progressive pressure may



Testing apparatus.

have caused a slight twist in the pointer, and the results of the level readings were considered much more reliable.

Following is the record of the pressures and corresponding gage readings:

Test conditions.	Roof block.		Floor block.	
	Pres- sure.	Gauge.	Pres- sure.	Gauge.
	Tons.	Inches.	Tons.	Inches.
At start, before applying pressure.....		15.25		2.375
With beam and empty box.....	7.6	15.25	8.8	2.325
Weight box partly filled.....	20.0	15.25	22.0	2.312
Weight box filled.....	33.3	15.25	36.5	2.250
With extra weights added.....	36.0	15.25	39.5	2.250

The limit of pressure for the apparatus was reached at 39.5 tons. What additional pressure the rock would have supported is not known.

The level readings showed no actual settlement of the floor block as a whole, but indicated a slight tilting of the block which was accounted for by the small movement of the beam and post during the process of loading. The conclusion therefore was that there was no measurable yielding at either the roof or floor block.

Applying the result of the test to the design of the dam it is recognized that the conditions are not quite similar for the reason that in the test the load is applied at the top of a pyramid of pressure, whereas under the dam it is applied at the top of a theoretical column of uniform thickness.

Taking into account this difference in conditions, since the material stood under nearly 40 tons per square foot without yielding it is considered safe to design the dam with pressure on the foundation not to exceed 10 tons per square foot. All pockets of soft material exposed in preparing the foundations should, however, be excavated so as to leave a surface of the harder rock.

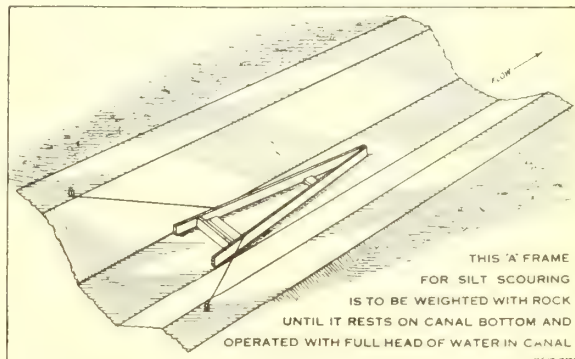
### SCOURING SILT FROM CANALS.

In the RECLAMATION RECORD for September, 1919, an article by Project Manager H. M. Schilling described the method developed on the Umatilla project for removing blow sand from the concrete-lined channel of the West Extension canal. This method consists in the use of a movable wooden template supported in the canal section. Around this template the water flows with sufficient velocity to carry the sand ahead and as a section is cleared the template is moved downstream to a new position, gradually working the sand downstream to the nearest sluiceway, where it is removed.

Mr. T. R. Smith, hydrographer, Strawberry Valley project, furnishes a sketch and description of a device used on the canal of the Mapleton irrigation district, Utah, to keep the silt moving in the upper end of their canal. This device, as shown by the sketch, consists of a wooden A frame which is placed in the canal and loaded with rock until it rests on the bottom. Stay lines attached to the rear end of the A frame and fastened to the stakes driven in the canal banks, or held by a man on either bank, hold the A frame in place. The water washes under the A frame and scours out the silt immediately in front of it and the A frame settles a corresponding amount. This action continues until the desired amount of silt is scoured from this particular spot and then the A frame is allowed to move down the canal to a new position, where the scouring action again takes place.

The sketch submitted shows the scheme used by the Mapleton Lateral Board of the Strawberry Valley project to scour the accumulated silt from their main canal during the season 1919. They operated the frame by means of a man on either bank holding the stay lines. As soon as the frame ceased to settle, it was allowed to move gradually downstream.

The A frame is very effective using it in this manner and large quantities of silt can be removed very cheaply without the inconvenience caused by turning the water out of the canal in order to do the cleaning by the ordinary methods used. In the above-mentioned case 1.2 feet of silt were removed from the canal bottom by this means.



"A" frame for silt scouring.

A frames of this type can be made at very reasonable cost, are highly efficient, and can be operated at a minimum cost.

### JAMES HAMILTON WHELAN, 1895-1920.

James Hamilton Whelan, a former employee of the Reclamation Service, died on June 17, 1920, at Marshall, Minn., of injuries incurred while serving with the American forces in France, where he was gassed and wounded.

Mr. Whelan was born in Haminford, Nebr., and received his education in the Denver public schools. On November 22, 1917, he was employed on the Minidoka project, Idaho, where he served until June 7, 1918, when he enlisted with the 143d Machine Gun Battalion.

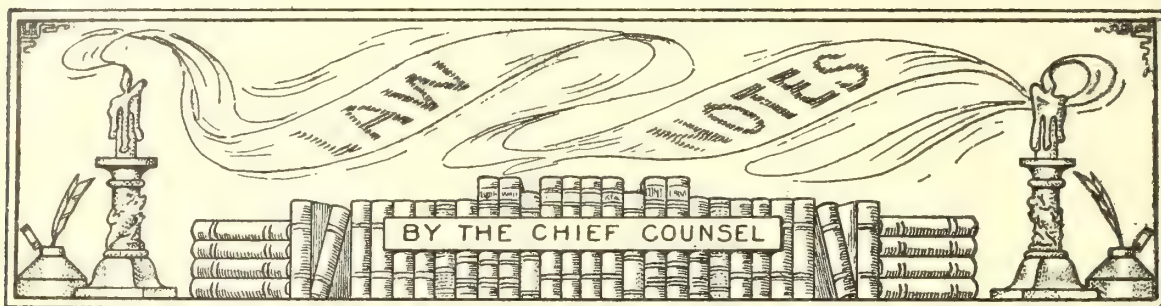
He is survived by his mother, Mrs. Rose Whelan, who resides in Denver, and by two sisters, Mrs. Grace Early and Miss Irene Whelan, and by three brothers, Frank, Walter, and Thomas.

Home canning at its best provides a supply of every fruit and vegetable that has been in season during the summer for use during the winter.

### SPECIAL NOTICE.

Water users and others receiving the RECLAMATION RECORD are requested to cooperate in keeping our mailing list up to date by notifying the chief clerk, U. S. Reclamation Service, Washington, D. C., immediately of any change of address. When writing, be sure to give your full name and old address.





### Payette-Boise Water Users' Association v. Cole.

The following is the syllabus of the interlocutory opinion, recently reported, handed down by United States District Judge Dietrich in the case of Payette-Boise Water Users' Association (Ltd.), v. Cole et al. (Idaho; 263 Fed., 734):

Under reclamation act June 17, 1902 (32 Stat., 388), providing that the Secretary of the Interior may let contracts for the construction of a project and thereupon shall give notice of the lands irrigable, the limit of area per entry, and of the charges which shall be made per acre upon such entries, which shall be determined with a view of returning to the reclamation fund the estimated cost of construction, the cost is to be estimated and apportioned before construction, and in case of settlement under such conditions the price can not be later increased, though the published estimate is insufficient to cover the actual cost.

The requirement of reclamation act June 17, 1902 (32 Stat., 388), that the cost of a project shall be estimated and apportioned before construction, may be waived by settlers and the Secretary of the Interior, and was waived where there was no formal compliance with such requirement and all parties understood that ultimately the settlers would reimburse the government for its actual and necessary outlay.

Where, instead of estimating and apportioning the cost of a reclamation project before construction, it was mutually understood that the settlers would reimburse the Government for the actual cost, they were chargeable with the actual cost only, and the Secretary of the Interior was without discretion in fixing the charge.

Where a reclamation project was constructed under a mutual understanding that settlers would reimburse the Government for the actual cost, the actual cost of the project was a matter for judicial investigation and determination.

Where irrigation districts subscribed for stock in an association of water users on a reclamation project entitling them to water, the board of directors and the Secretary of the Interior held authorized to release the irrigation districts from their subscriptions and obligations to take water.

Where an irrigation district subscribing to stock in an association of water users on a reclamation project was released from its obligations by the association's board of directors, and though the other subscribers learned thereof within a reasonable time no action to set aside the release was brought for several years during which the district landowners ceased to exercise any rights as stockholders and were not recognized as such, and the district issued bonds by means of which it procured other water, and lands in the district were bought and sold and trans-

fers thereof made, the members of the association were chargeable with laches preventing them from attacking the release in equity.

Where a reclamation project was constructed under a mutual understanding that the actual cost should be charged against settlers, the cost of drainage work done for the benefit of lands in the project, or to protect other lands from conditions resulting from the construction and operation of the project, was chargeable against the project lands.

Where landowners within a reclamation project outside of an irrigation district are charged \$80 per acre, while those within the district are charged only \$70, because of the possibility that all those outside the district will not take water, those paying such higher price are entitled to the additional service for which they pay, and, if seven-eighths of the acreage takes water, they are entitled to the water rights for the entire acreage.

Settlers on lands within a reclamation project could not be required as a condition of obtaining water to make a floating grant in perpetuity, not only to the Government but to its successors in control of the project, of rights of way for the construction, maintenance, and operation of ditches, canals, flumes, etc., even though the patents for the lands were issued prior to act August 30, 1890 (26 Stat., 391), requiring patents to reserve a right of way for the ditches or canals constructed by the United States.

An application for water for land in a reclamation project, providing that the measure of the water right was that quantity of water which should be beneficially used for irrigation, not exceeding the share proportionate to irrigable acreage of the water available as determined by the project manager or other proper officer during the irrigation season for the irrigation of lands under the land unit, did not authorize the project manager or other officer to decide whether a landowner needed water, but only to determine the amount of water actually available, but was too indefinite, and landowners could not be required to execute it as a condition of obtaining water.

Whatever may be the extent of the discretion of the Secretary of the Interior in the case of a reclamation project where the charge for water and conditions of purchase are announced in advance of construction, as required by statute, he could not exercise unlimited power to determine the conditions on which water would be supplied where the project was constructed under the mutual understanding that landowners might procure water by paying their ratable proportion of the cost of construction and submitting to other equal and reasonable conditions.

Where a reclamation project was constructed with the mutual understanding that settlers would reimburse the Government for the actual outlay and contracts had been made to supply irrigation districts and others with water, settlers were entitled to some authoritative description of the property to which their rights related and a definition of the extent of their interest in the project before they

could be required to pay, and to have from an authoritative source and of record a declaration of the cost of the project and of the portion of which it was intended they should become the beneficial owners, and could be required to pay the cost only of such portion of the works or such interest therein as was set apart for the use of their lands.

### **Rights of Way for Power and Irrigation.**

The United States Circuit Court of Appeals, Ninth Circuit, decided the following points regarding rights of way over public lands for power and irrigation in the case of *United States v. Kern River Co. et al.* (Calif., 264 Fed. 412):

Under act March 3, 1891 (26 Stat., 1095), granting a right of way through the public lands to any canal company formed for the purpose of irrigation, and act May 11, 1898 (30 Stat., 404), providing that such rights of way may be used for purposes of a public nature and for certain other purposes, including the development of power as subsidiary to the main purpose of irrigation, a right of way for a canal for the development of power can only be obtained when such development is subsidiary to the main purpose of irrigation.

The approval by the Secretary of the Interior of a canal company's maps of location, filed as the basis of a right of way through a forest reserve, was obtained by fraud, where, at the time of its original and amended applications, its attention was called to two statutes, one granting a right of way for irrigation purposes and the other for power purposes, but it falsely certified that the right of way was desired solely for the purposes prescribed in the acts relating to rights of way for irrigation purposes.

If the approval by the Secretary of the Interior of a canal company's maps of location of its right of way through a forest reserve was given with full knowledge of the facts that the canal was to be constructed for power purposes, and that the company had not complied with the statute relative to rights of way for such purposes, he exceeded his authority, and the validity of his approval might be challenged in a suit to set aside such approval and restrain the use of the right of way.

### **Rights of Way Under Act of August 30, 1890.**

So long as the Reclamation Service can apply surplus water appropriated for a project to a beneficial use, although on lands outside the project, and thus lessen the cost to lands within the project, it is within the scope of its authority and the service may acquire rights of way under the act of August 30, 1890 (26 Stat. 391). (*Griffiths v. Cole et al.* (Idaho), 264 Fed. 369.)

### **Right of Government to Recover and Use Seepage Water.**

Where water is brought into a locality through Government reclamation project canals and, after percolation has been recovered by means of its drainage ditches, the Reclamation Service has the first right to conserve and use it even to provide irrigation to privately owned lands. (*Griffiths v. Cole, et al.* (Idaho), 264 Fed. 369.)

### **Irrigation by Government of Lands in Private Ownership.**

In *United States v. Burley* (C. C.; 172 Fed. 815), *Burley v. United States* (179 Fed., 1; 102 C. C. A., 459; 33 L. R. A.

(N. S.), 807) emphasis was placed upon the fact that the reclamation of its own public lands was the primary or dominant purpose of the Government, and that was thought to be a necessary prerequisite to the right of the Government to condemn land for a reservoir site. Whatever may be its maximum power under the Constitution, as then, so now, it is thought that by the reclamation act (32 Stat., 388) Congress has chosen to confer authority upon the Secretary of the Interior only to undertake projects the primary or predominant purpose of which is to reclaim public lands. (*Griffiths v. Cole, et al.* (Idaho), 264 Fed. 369.)

### **Use of Seepage Waters in Utah.**

Where seepage waters, which would otherwise return to a stream and were part of the source of supply, can be used by the owner of the land on which they collected, he may use them so long as such diversion does not prevent their return to the stream and injure the lower prior appropriator. (*Rasmussen v. Moroni Irrigation Co. et al.* (Utah), 189 Pac., 572.)

### **Saving of Irrigation Water in Utah.**

While an original appropriator of water acquires a right in his means or method of diversion which may not be changed to his prejudice, yet, if another user who is entitled to the water can by changing the manner of diversion save water, the courts may permit him to make such change and use the water saved. (*Big Cottonwood Tanner Ditch Co. et al. v. Shurtliff et ux.* (Utah), 189 Pac. 587.)

### **Transfer of Materials and Supplies from One Department to Another.**

On June 22, 1920, the comptroller decided that section 5 of the deficiency appropriation act of July 11, 1919 (41 Stat., 67), is permanent legislation. This section reads as follows:

SEC. 5. That the heads of the several executive departments and other responsible officials, in expending appropriations contained in this or any other act, so far as possible shall purchase material, supplies, and equipment, when needed and funds are available, from other services of the Government possessing material, supplies, and equipment no longer required because of the cessation of war activities. It shall be the duty of the heads of the several executive departments and other officials, before purchasing any of the articles described herein, to ascertain from the other services of the Government whether they have articles of the character described that are serviceable. And articles purchased by one service from another, if the same have not been used, shall be paid for at a reasonable price not to exceed actual cost, and if the same have been used, at a reasonable price based upon the length of usage. The various services of the Government are authorized to sell such articles under the conditions specified, and the proceeds of such sales shall be covered into the Treasury as a miscellaneous receipt: *Provided*, That this section shall not be construed to amend, alter, or repeal the Executive order of December 3, 1918, concerning the transfer of office material, supplies, and equipment in the District of Columbia falling into disuse because of the cessation of war activities.



### Publication in Newspaper of Notice of Sale of Lands.

Under laws requiring publication for periods of 30 or 60 days, publication may be had either in a weekly or a daily newspaper. In the acts of February 2, 1911 (36 Stat., 895), and May 20, 1920 (41 Stat., —), relating to the sale of lands on Federal irrigation projects, the language "by publication for not less than 30 days" deals with the period during which notice is to be given, and is not a statutory requirement that publication be had for 30 consecutive days in a daily newspaper. Where a weekly newspaper of general circulation is the paper nearest the land, the purpose of the statutes will be fully subserved by publication in five consecutive issues of such newspaper. (Departmental decision, June 21, 1920.)

### Purchases of Books for Field Offices Not Limited by Annual Appropriations.

The act of March 15, 1898 (30 Stat., 316), provides in Section 3 as follows:

Hereafter law books, books of reference, and periodicals for use of any executive department, or other Government establishment not under an executive department, at

the seat of Government, shall not be purchased or paid for from any appropriation made for contingent expenses or for any specific or general purpose unless such purchase is authorized and payment therefor specifically provided in the law granting the appropriation.

On July 2, 1920, the comptroller decided that this prohibition has no direct application to purchases for field service, but applies only to purchases for use of an executive department or other Government establishment at the seat of Government, Washington, D. C. It follows that purchases of law books, books of reference, and periodicals for use of the Reclamation Service in its field offices are not limited to the specific appropriation for these articles made annually in the sundry civil acts.

### Handbook of Irrigation District Laws.

The edition of Handbook of the Irrigation District Laws of the Seventeen Western States of the United States, by Will R. King and E. W. Burr, published by the House Committee on Irrigation of Arid Lands, has been exhausted. The Reclamation Service has secured a reprint for official use, and incidentally to meet a part of the large general demand for this excellent work. The book will be supplied by the Service in paper covers for \$1 per copy, to pay the cost of reprint.

### List of Former Attorneys of the Reclamation Service.

Name.	Location.	Date of entry.	Date of separation.	Cause of separation.
Charles F. Stone.....	Klamath Falls, Oreg.....	Aug. 1, 1906	June 5, 1907	Resignation.
C. B. Sternberg.....	do.....	June 3, 1907	Aug. 31, 1907	Do.
Edward H. Bispham.....	Mitchell, Nebr.....	Nov. 16, 1906	Feb. 27, 1908	Do.
Harold B. Gilbert.....	Yakima, Wash.....	Mar. 5, 1909	Dec. 31, 1910	Do.
Wilson S. Wiley.....	Klamath Falls, Oreg.....	June 19, 1907	Apr. 10, 1911	Do.
Henry L. Green.....	Washington, D. C.....	Nov. 24, 1910	May 26, 1912	Expiration of leave.
Nathan K. Buck.....	Yakima, Wash.....	June 4, 1907	Sept. 30, 1913	Resignation.
William B. Owen.....	do.....	Feb. 1, 1909	Dec. 31, 1913	Death.
Charles S. Witbeck.....	Los Angeles, Calif.....	Dec. 1, 1906	Apr. 30, 1914	Resignation.
Ralph B. Williamson.....	Yakima, Wash.....	Nov. 16, 1906	Aug. 24, 1914	Do.
Charles A. Mansuy.....	Washington, D. C.....	May 1, 1902	Sept. 23, 1916	Death.
Edward S. Taylor.....	Portland, Oreg.....	Apr. 1, 1909	June 15, 1917	Resignation.
McGill Conner.....	Washington, D. C.....	Apr. 1, 1917	July 31, 1917	Transfer.
Eugene B. Hoffman.....	do.....	Nov. 16, 1910	Sept. 1, 1917	Death.
John M. McKinney.....	do.....	Jan. 26, 1905	Jan. 16, 1918	Do.
O. Glenn Cowhick.....	do.....	Aug. 2, 1904	Oct. 8, 1918	Do.
Arthur R. Honnold.....	Scottsbluff, Nebr.....	Aug. 18, 1909	Mar. 31, 1919	Resignation.
Harold D. Padgett.....	Billings, Mont.....	Jan. 3, 1916	Dec. 31, 1919	Do.
Edwin H. Peery.....	San Francisco, Calif.....	Nov. 9, 1914	Jan. 29, 1920	Death.
Oliver P. Morton.....	do.....	Nov. 16, 1906	Mar. 22, 1920	Resignation.
Will R. King <sup>1</sup> .....	Washington, D. C.....	June 20, 1913	June 15, 1920	Do
Andrew G. Pollock.....	do.....	Sept. 1, 1916	July 9, 1920	Furlough.
Richard J. Coffey.....	San Francisco, Calif.....	Apr. 2, 1912	Aug. 12, 1920	Resignation.

<sup>1</sup> Chief counsel.

—Ottomar Hamde.

The certainty of satisfactory profits year by year will insure a satisfied community, the members of which will build permanent homes upon the land with the idea of residing on the home farm during the course of their lifetime, and handing over to the succeeding generation a farm of greater value than when operations were first begun thereon.

A community canning kitchen, either of the type to which members may bring their products to be canned at a fixed price per can or that in which members work in groups on special days with the help of modern large-scale equipment, saves garden products which would otherwise waste because the housewives of the locality have not time or strength to can them.

## JUNE WEATHER IN THE WESTERN STATES.

By P. C. Day, U. S. Weather Bureau.

Cool weather predominated in the Western States during June, while as to rainfall there was great diversity of conditions. Over the southern Rocky Mountain region and much of the southern Plains scarcely any period of the month was as warm as normal, and the same was true in the northern Plateau region; also, save for the warm second week of the month, in Wyoming, Montana, and the Dakotas. The third week of the month was notably hot in California. In a few scattered areas the month as a whole was slightly warmer than normal, but everywhere else it was cooler than normal, and especially so along and near the Rocky Mountain Divide and in northern Idaho, eastern Washington, and eastern Oregon, where some districts averaged from 3° to 6° cooler than normally.

During the first half of June there was important rainfall in most of the far Northwest, the area extending southward along the coast to include northwestern California; also many portions of the northern border States and of the Plains States had good rains, likewise in the eastern part of New Mexico. During the latter half much the greater part of the country to westward of the Continental Divide was without rain of importance, although the higher

portions of Arizona, the southwestern part of Utah, considerable portions of Idaho, and a few other small areas received good showers; but to eastward of the Divide there were liberal rains in nearly all districts, save southeastern Wyoming and eastern Colorado, and the amounts were unusually large in much of central Montana and of western South Dakota. The monthly totals of rainfall were fairly large for the season in the western parts of Washington and Oregon, and in nearly all parts of Idaho, Montana, and New Mexico, also locally in the other Mountain and Plateau States. In the Plains States most counties had less than normal rainfall, and there was much irregularity in distribution, but only a few portions had seriously dry conditions.

The weather was mainly favorable for fruit, in spite of local frost damage, chiefly during the first week. Truck crops in some districts were harmed by frost, either early in the month or near the end, and in several areas were in need of moisture. The month was mainly favorable for small grains, although too dry in a few districts, and was nearly everywhere favorable for live stock.

## IRRIGATION STATISTICS, FOURTEENTH CENSUS.

The Director of the Census announces, subject to correction, the following preliminary statistics on irrigation for the counties named. Similar statements for other coun-

ties will be issued as soon as the figures are available and will be published from time to time in the RECLAMATION RECORD.

*Irrigation by counties, 1920 and 1910.*

State and county.	Acreage to be irrigated by works either completed or under construction.			Acreage to which existing works are capable of supplying water.			Acreage irrigated.			Acreage available for settlement in 1920 <sup>1</sup>
	1920	1910	Increase (acres).	1920	1910	Increase (acres).	1919	1909	Increase (acres).	
Fresno County, Calif. <sup>2</sup>	957,780	633,652	324,128	798,943	560,326	238,617	517,876	402,318	115,558	93,735
Imperial County, Calif.	512,960	375,000	137,960	442,740	242,000	200,740	402,671	190,711	211,960	20,000
Kern County, Calif.	473,709	402,806	70,903	328,258	217,418	110,840	222,685	190,034	32,651	9,838
Crowley County, Colo. <sup>3</sup>	8,329			3,110			1,829			5,000
Custer County, Colo.	42,939	34,610	8,329	37,268	33,610	3,658	24,016	29,248	4-5,232	
Gilpin County, Colo.	320	43	277	202	43	159	162	43	119	
Kiowa County, Colo.	17,283	2,310	14,973	2,083	1,460	623	418	1,460	4-1,042	
Mineral County, Colo.	7,300	10,590	4-3,290	5,545	9,310	4-3,765	3,600	7,762	4-4,162	
Pueblo County, Colo.	186,181	174,518	11,663	140,632	69,442	71,190	128,307	50,718	77,589	44,578
Bingham County, Idaho <sup>4</sup>	191,261			184,056			144,200			14,500
Power County, Idaho <sup>5</sup>	4,390			3,150			2,211			
Concho County, Tex. <sup>6</sup>	376			213			188			
Dinmit County, Tex.	19,374	9,934	9,440	10,012	5,618	4,394	5,058	3,327	1,731	1,308
Lampasas County, Tex. <sup>7</sup>	486			469			116			
Mills County, Tex. <sup>8</sup>	402	1,829	4-1,427	380	1,468	4-1,088		1,208	4-1,208	
San Saba County, Tex. <sup>9</sup>	2,138	3,135	4-997	1,784	2,379	4-595	35	2,022	4-1,987	

<sup>1</sup> To be supplied with water by works either completed or under construction.

<sup>2</sup> In this county there has been since 1916 a large development of underground water by pumping. Part of this water is used to supplement the supply from canals, and consequently does not add to the acreage irrigated.

<sup>3</sup> This county was organized from a part of Otero County in 1911; consequently no comparable figures for 1910 available.

<sup>4</sup> Decrease.

<sup>5</sup> Most of the land to be irrigated is in one large project that is not yet supplying any water for irrigation.

<sup>6</sup> This county was divided in 1911, Bonneville County being organized from a part of Bingham County; consequently no comparable figures for 1910 available.

<sup>7</sup> This county was organized in 1913; consequently no comparable figures for 1910 available.

<sup>8</sup> The returns for this county were not presented separately in 1910.

<sup>9</sup> The wide divergence between the acreage irrigated in 1919 and the acreage which existing works are capable of supplying in 1920 is explained by the fact that 1919 in Texas was abnormally wet, rendering irrigation unnecessary to a considerable extent.

<sup>10</sup> Decrease due to fact that 1919 was abnormally wet in Texas, and many irrigation enterprises were abandoned.



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

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HUGH A. BROWN, EDITOR.

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## ON THE CHESAPEAKE & OHIO CANAL

By W. I. Swanton, U. S. Reclamation Service.

On one of the Saturday afternoon outings of the Home Club, an organization of employees of the Department of the Interior, about 100 members from the various bureaus of the department journeyed to Great Falls by the canal, and it is thought that a brief account of this historic waterway, begun by George Washington, may be of interest to the settlers on our projects, who have to do only with irrigation canals.

The trip was made in a double-deck gasoline launch, about 60 feet in length, having a capacity of about 85 persons, and equipped with electric lights and all facilities for a comfortable trip. The crew consisted of Capt. Hilton, a mate, and an engineer.

The canal extends along the north bank of the Potomac River from Georgetown to Great Falls, a distance of about 14 miles, and thence on to the coal mines near Cumberland, Md., 185 miles from Washington.



ON BOARD THE PEGGY.

Left to right: P. J. Murphy, Miss Julia W. Atwood, J. Gangras, Miss Bess Cain, Miss Helen Harvey, Miss Grace M. Layman.

The boat leaves the Georgetown terminus on the Saturday afternoon trip at about 2 o'clock, and after passing under two low bridges, where it is necessary to lower the upper deck awnings, the first lock is reached near the District line. It is an interesting experience to pass through these locks and to watch the various operations of manipulating the gates, regulating the flow of water, and handling the boat itself. There are 16 of these locks between Georgetown and Great Falls. They are built of stone masonry with wooden gates, and are 100 feet in length, 15 feet wide, and have a lift of 8 feet.

The speed of the boat, due to the effect of "back wash" on the canal banks, is limited to 4 or 5 miles an hour, but it was pleasant gliding along in the quiet waterway, often entirely arched over by the dense growth of trees on either bank. Near Glen Echo we passed through a large camp colony, and many of the campers were bathing or fishing, as bass and catfish are plentiful. About half the distance to Great Falls we passed through a group of 7 locks within a distance of 1 mile, and many got off the boat and

walked along the winding towpath. Near the Falls we passed through a group of 6 more locks, so that the total lift from Georgetown to the Falls was 128 feet, which did not include 5 locks from the Georgetown landing to the river, making a total rise of the canal of 168 feet in the 14 miles.



A short section of the canal.

The present Chesapeake & Ohio Canal is the successor of the disconnected series of canals built by the Potomac Navigation Co., of which George Washington was president in 1785. This canal was chartered in 1824 and construction to Cumberland was completed in 1850. The canal has a minimum depth of 6 feet, the bottom width ranges from 31 to 41 feet, and the side slope in embankment is 2:1 with a 14-foot width of bank or towpath, and a freeboard or height above the water surface of 8 to 18

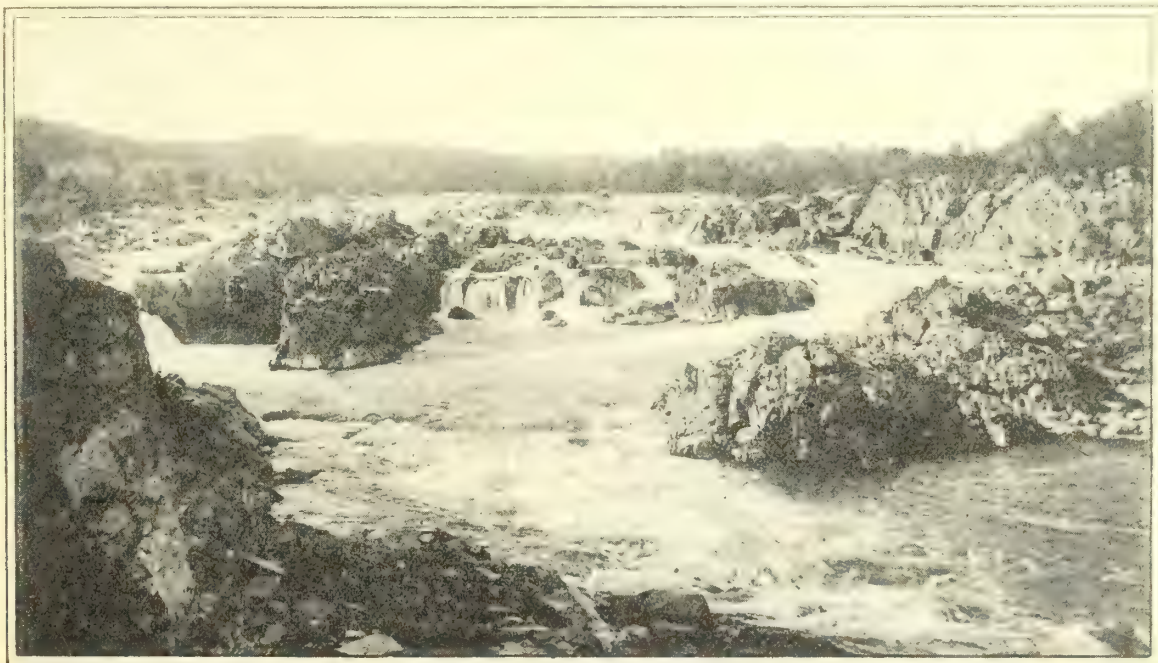
inches. At one place near Cumberland there is a tunnel 3,600 feet long—about the length of the one built by the Reclamation Service at Klamath Falls, Oreg.

One would naturally think that the banks of a canal about 75 years old would not need much care or maintenance, but constant vigilance is necessary to prevent damage from burrowing animals, especially crawfish. A "level walker," as their ditchriders are called, is required for each 7 or 8 miles, and two repair gangs are maintained in the first 23 miles; two dredges with 1 yard dippers are in constant operation on the entire 185 miles. From 100 to 300 second-feet of water is constantly flowing in the canal.

The canal is operated much on the principal of a toll road, and the towing company has about 65 boats hauling coal from Cumberland near the mines, to tidewater at Georgetown. These boats are 93 feet long, 14 feet wide, and have a capacity of 115 tons (of 2,240 pounds) of coal each. A round trip takes about a week, and usually three round trips are made a month; the motive power consisting of 4 to 6 mules working in teams of 2 or 4 each 6 hours.

On arrival at Great Falls our party scattered in various directions for luncheon, many sitting on the rocks where a superb view of the Falls could be obtained. Congress at its last session made an appropriation of \$25,000 to enable the newly created Water Power Commission to investigate the feasibility of utilizing the Falls for the benefit of the Capital of the Nation, the report to be presented to Congress by January 1, 1921.

The return trip was made late in the evening, and a member of the party expressed the sentiments of all when he said that he felt as if he had had two holidays in one.



GREAT FALLS OF THE POTOMAC.



## MONTHLY PROGRESS REPORTS FOR JUNE.

Monthly conditions of principal Reclamation Service reservoirs for June, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.....	Roosevelt <sup>3</sup>	1,305,000	2128	1903	1,371,210	1,290,955	1,371,210	129,953	2128.23	2123.42	2128.23
California, Orland.....	East Park.....	51,000	1199.68	1111.68	19,550	12,370	19,550	6,516	1177.13	1168.91	1177.13
Idaho:											
Boise.....	Arrowrock.....	280,000	3211	2956	278,600	272,630	281,000	313,958	3211.7	3209.7	3212.5
	Deer Flat.....	177,000	2518	2488	138,336	108,281	138,336	58,148	2513.75	2510.05	2513.75
Minidoka.....	Lake Walcott.....	95,180	4245	4236	100,730	103,380	105,790		4245.46	4245.68	4245.88
	Jackson Lake.....	847,000	6769	6730	356,060	698,480	698,480	12,658	6748.33	6763.06	6763.06
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	30,100	27,900	30,100	1,979	2212.9	2212.2	2212.9
St. Mary Storage.....	Sherburne.....	33,000	4765	4720							
Sun River.....	Willow Creek.....	16,700	4130	4085	12,113	16,700	16,700		4125.2	4130	4130
Nebraska-Wyoming, North Platte.....	Pathfinder.....	1,070,000	5852	5670	1,016,590	1,129,130	1,153,050	532,810	5849.6	5854.55	5855.54
	Lake Alice.....	11,400	4182	4159	8,903	11,380	11,765		4178.6	4182	4182.5
	Lake Minatare.....	60,700	4125	4074	54,443	42,671	54,443		4122	4116	4122
Nevada, Newlands.....	Lake Tahoe.....	120,000	6230	6224					6225.78	6225.98	6225.98
	Lahontan.....	290,000	4162	4060	202,100	195,370	202,100	42,680	4153.8	4152.9	4154.1
New Mexico:											
Carlsbad.....	McMillan.....	45,000	3267.7	3241.6	40,000	44,000	45,000	60,000	3266.9	3267.5	3267.7
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4231.5	1,639,748	2,092,967	2,092,967	117,306	4377.8	4392.35	4392.35
Oregon, Umatilla.....	Cold Springs.....	50,000	621.5	560	48,350	38,700	48,350	9,132	620.42	613.6	620.4
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	301,000	292,000	301,000	1,836	4533.7	4533.2	4533.7
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	200,620	201,150	201,150	4,889	2974.7	2974.7	2974.7
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	232,000	234,000	238,000		7555.5	7556.1	7556.6
Washington:											
Okanogan.....	Conconully.....	13,000	2287	2232	2,700	2,214	2,700	1,732	2258	2256	2258
Yakima.....	Bumping Lake.....	34,000	3426	3389	30,895	39,080	39,285	205	3423.8	3430	3430.15
	Lake Clealum.....	22,800	2134	2122	24,920	32,095	33,240	1,145	2134.3	2137.4	2137.92
	Lake Kachess.....	210,000	2258	2192	213,275	225,735	229,735		2456.2	2459.9	2459.95
	Lake Keechelus.....	152,000	2515	2425	138,885	147,175	153,450	6,275	2509.4	2512.8	2515.3
Wyoming, Shoshone.....	Shoshone.....	456,600	5360	5132.3	361,560	479,663	483,113	207,373	5344.6	5363.4	5363.9

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> Proposed regulation.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—Water was run in all of the canals during June. The demand for irrigation water was very heavy during the last half of the month.

There were six maintenance crews in the field during the month and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 379; average head of stock, 101; miles main canals cleaned, 75; miles laterals cleaned, 193; number of new structures installed, 19; number of old structures repaired, 200; riprap placed, 950 feet; concrete placed, 23 cubic yards; dirt fill placed, 3,874 cubic yards; concrete pipe laid, 472 feet; corrugated pipe laid, 96 feet.

The protective work being done on the bank of the Arizona Canal 2,000 feet below Granite Reef was completed and the crew was moved to the Indian Bend wastewater to make repairs to the banks which were washed out during the floods of last year.

The Ruth excavator removed berm and moss from the Highline Canal, south of the division gates, for a distance of 3½ miles and moved approximately 5,300 cubic yards from both banks. This machine will be engaged during July in similar work north of the division gates.

The P. and H. dragline worked on widening the Eastern Canal during the first half of the month when it was moved to the Western Canal to remove an accumulation of silt which seriously affected the operation of the canal.

*Operation of power system.*—The total power generated during the month was 7,213,810 KWH.

The Roosevelt power plant operated continuously during the month. Water ceased flowing over the spillways of the dam on June 3. The Cross Cut power plant operated continuously during the month. The South Consolidated plant operated 99 per cent, the Arizona Falls plant 99 per cent, and the Chandler power plant 97.2 per cent.

All pumping plants were available for use when needed with the exceptions of Cleman's plant and pumping plant 27E OS. A new runner and shaft were installed at Cleman's plant and the hole top oil switch was repaired at pumping plant 27E OS.

*Construction work, Roosevelt.*—The construction crew at Roosevelt was engaged during the month on road repairs, cleaning up debris in river below south spillway of dam, installing a gauging station on the river below the dam, repairing equipment, installing a ventilator in the roof of the powerhouse, and on the maintenance of the camps.

*Office.*—The following acreages were entitled to irrigation water service on the first of the month:

	Acreage.	Number of applications.
Permanent.....	171,888.75	4,264
Normal flow.....	2,109.75	645
Temporary.....	18,972.26	111
Town sites.....	3,973.75	6
Total.....	196,944.51	5,026

—F. C. Hinshaw.

## YUMA PROJECT, ARIZONA-CALIFORNIA.

June weather was very favorable with just a trace of rain. Labor conditions were fair.

**Construction.**—On the East Drain Lateral of Yuma Valley drainage, the Bucyrus dragline moved 19,500 cubic yards of material from station 20 to station 33. One large and one small wooden structure were built.

**Operation and maintenance.**—18,803 acre-feet of water were delivered to approximately 31,000 acres. In the Yuma Valley, Monighan dragline No. 1 cleaned 6,200 cubic yards of silt from Central Canal, station 72 to station 103. Monighan dragline No. 2 cleaned 8,200 cubic yards of silt from West Main Canal, station 970 to station 1006. The V machine cleaned 17½ miles of small laterals.

Three and nine-tenths miles of small laterals were cleaned by the Ruth dredger on the Yuma Indian Reservation.

The spring flood of the Colorado River was the greatest in run-off as well as having discharged at the peak a larger volume than any previous flood of record. During March and April the run-off was slightly below normal, May about normal, and June in excess of normal, the run-off in June exceeding by more than 1,000,000 acre-feet any previous peak month of record. For the months of March, April, May, and June, comparing the run-off for maximum years, the greatest, in 1914, of 12,250,000 acre-feet is exceeded by 400,000 acre-feet for the same period in 1920. From June 2 to 25, inclusive, there was in excess of 100,000 feet flowing by Yuma.

The peak occurred on June 8, the gage reaching 30.5 feet and the discharge 190,000 second-feet.

During the highest period a shortening of the river of about 6.5 miles took place between Yuma and Laguna dam at a point opposite Sellew Siding. The retrogression that took place relieved the situation on this piece of levee;

as there were 4 miles with but 1.5 feet freeboard and with one to 3 feet of water standing on the inside, the embankment was completely saturated. This cut-off has relieved 8 miles of levee from the necessity of rock protection, although 2.5 miles had been heavily revetted. There were seven points of attack, four on the Reservation levee and three on the Yuma Valley levee. Two of these became aggravated, the 8-mile point on the Reservation levee and the 21-mile post on the Yuma Valley levee. The other points were not serious.

The Yuma quarry only was operated and one train crew and one shovel crew were in service, although there was on hand, if necessity demanded, organization for another complete shift; 34,864 cubic yards of rock were placed during the month, 23,760 cubic yards to the Reservation levee and 11,104 to the Yuma Valley levee.

The water below the dam at Potholes stood 2.7 feet higher than the crest of the dam, a large part of the camp being inundated, the water standing 2.5 feet deep in the office building. No damage was done, however. The stability of the levee system was well proven as the flood was passed without a breach.

The maximum discharge of the Colorado River during the month was 190,000 second-feet, minimum 73,800 second-feet, and the mean 129,240 second-feet. The gage on June 30 was 21.4 and the discharge 73,800 second-feet. The discharge for the month in acre-feet was 7,690,314.

**Yuma auxiliary project.**—About 20 miles of bench levels were run. Cross sections of the project East Main Canal were taken from station 173 to the Donovan turnout and comparative estimate made between building a canal on a higher grade or raising the bank of the East Main Canal. About 15 miles of laterals were located and profiles taken. Studies and tentative design for a construction plant for the manufacture of concrete pipe were made.

## Crop report, Yuma project, Arizona.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	11,925	Ton.....	31,773	2.66	\$19.15	\$608,558	\$51.03
Alfalfa seed.....	6,425	Pound.....	2,350,385	366	.297	698,164	108.66
Barley.....	523	Busbel.....	11,806	22½	1.28	15,114	28.70
Corn sorghum.....	5,134	do.....	160,821	31.3	1.09	175,900	34.26
Cane and corn fodder.....	139	Ton.....	482	3.47	12.79	6,167	44.37
Cotton, short staple.....	30,670	Pound.....	10,957,900	357	.42	4,602,318	150.06
Cotton, long staple.....	275	do.....	69,550	253	.80	55,640	202.33
Fruit.....	66	Acre.....				11,420	173.03
Garden.....	365	do.....				24,895	81.62
Hay, except alfalfa.....	811	Ton.....	1,039	1.28	19.14	19,887	24.52
Pasture.....	3,131	Acre.....				62,480	19.96
Wheat.....	764	Busbel.....	15,940	21	2.00	31,931	41.79
Cotton seed.....		Ton.....	10,850		60.00	651,000	21.04
Additional revenue derived from feeding alfalfa straw and pasturing stalk lands.....						48,735	
Less duplicated areas.....	7,844						
Total cropped.....	52,324		Total and average.....			7,012,209	134.01
			Areas.		Acres.	Farms.	Per cent of pro- ject. <sup>1</sup>
Land irrigated but not cropped.....	960		Total irrigable area farms reported.....		60,000	1,225	92
			Total irrigated area farms reported.....		53,284		82
			Under water right applications.....		23,000	560	35
			Under rental contracts.....		30,284	665	47
Total irrigated.....	53,284		Total cropped area farms reported.....		52,324		80

<sup>1</sup> Excludes Yuma auxiliary project of 45,000 acres.



*Arizona cooperative work.*—The diamond drill party completed the Red Rock dam site and orders were issued to transfer the equipment and party to the Boulder Canyon dam site on the Colorado River.

Prof. Bakhmeteff, engineer, visited the project on the 23d and was shown the principal features. J. L. Burkholder, drainage engineer, Denver office, arrived on the 21st and inspected the Ruth dredger and the Boundary pumping plant.—*R. M. Priest.*

#### ORLAND PROJECT, CALIFORNIA.

June temperatures continued high, and there were 12 days of unusually severe hot dry north winds, which severely damaged the third crop of alfalfa. Fruit of all kinds was damaged, apricots suffering most. There was 0.12 inch rainfall at Orland, but none at East Park. Little water was available for irrigation from the unregulated flow of Stony Creek, and there was an unusually heavy loss of storage in transit from East Park to the project diversions.

A force of 25 laborers and 10 head of stock was employed on concrete lining when weather conditions would permit. The amount of lining placed was 6,500 square yards (300 cubic yards). Ten tons of grasshopper poison were mixed at the headquarters' plant for water users.

During the month most of the coarse gravel land planted to alfalfa used up the last of its season's pro rata of water. The amount of water delivered to farms was 3,500 acre-feet, and the number of acres irrigated 10,000.—*A. N. Burch.*

#### GRAND VALLEY PROJECT, COLORADO.

June weather was slightly cooler than normal and very favorable for outside work of all kinds. Labor was not plentiful, but a sufficient supply was available on most of the features to carry on the work without delay.

Nearly all crops made a good growth during the month and with few exceptions the prospects for satisfactory yields are very good. The first cutting of alfalfa produced a heavy crop of excellent quality. The thinning of sugar beets is in progress and there is every indication that this crop will be above the average. Winter wheat is ready to harvest, and promises a satisfactory yield. Corn, potatoes, and spring grains are all making a good growth.

The irrigation system was operated continuously throughout the month, supplying 12,000 acres of project lands and 8,500 acres in the Palisade and Mesa County irrigation districts. Water was shut out of the main canal for a few hours to clear the structures in the canyon division of trash and driftwood, and service at the lower end of the canal was interrupted for one day on account of a small break at the head of the East Salt Creek siphon. The maintenance forces were employed in repairing breaks in laterals, and building and installing weirs, turnouts, and other minor structures.

Drainage construction was continued with two drag-line excavators working on the project and one drag line and the trenching machine in the Grand Valley Draining District. Two and four-tenths miles of drain were completed involving 61,600 cubic yards of excavation. One survey party was engaged in the investigation of seeped areas on the project.

Official visitors on the project were R. F. Walter, assistant chief engineer, and F. B. Headley, of the experiment farm on the Newlands project.—*S. O. Harper.*

#### UNCOMPAGHRE PROJECT, COLORADO.

June weather was favorable for crop growth and all kinds of vegetation have made fine progress. On June 26 and 27 the precipitation amounted to 0.37 inch out of a total of 0.42 inch for the month.

Crops were late in starting in the spring, but most of them were up to nearly normal at the end of the month. Some alfalfa hay was bleached by the rain on the 26th and 27th, but no material damage was done.

Farm labor was scarce, and the effect is noticeable in the hay and beet fields. A small acreage of beets yet remained to be thinned and blocked due to the scarcity of labor.

There was a heavy demand for water for irrigation throughout the month with the exception of the last four days, when there was a slight decrease in the demand due to the rain and its interference with haying. All canals were run to capacity except the South Canal and the West Canal, which could only draw about 30 per cent from the Uncompahgre River during the period of the repair of the break in the South Canal.

The Uncompahgre River has given a good discharge during the entire month, but the discharge at no time was sufficient to do material damage along its course.

A serious break occurred in the concrete section of the South Canal below mile post 2 on the 6th. A second section of the concrete lining slid into the canal just above tunnel 1, after the water was shut out of the canal.

Repairs were made and water turned back in the canal on the 17th.

The lower part of the South Canal and the West Canal were the only portions of the project that were in any way affected by the shortage of water due to the break. The conditions have been such since the 17th that those portions of the system have been given additional water, so that little damage resulted to crops.

R. F. Walter, assistant chief engineer, was a visitor on the project May 31 to June 3; C. E. Piatt, examiner of accounts, June 2 to 7; G. M. Williams, of the Bureau of Standards, June 24 and 25, in connection with the test of alkali upon concrete; and P. A. Rosendorn, senior draftsman of the Washington office, June 29 and 30.—*Porter J. Preston.*

#### BOISE PROJECT, IDAHO.

June temperatures ranged slightly below normal. The precipitation was very light until the 29th, when a heavy storm of a few hours' duration swept over the upper end of Boise Valley and the surrounding foothills. This storm brought the mean precipitation for the month above normal. Considerable damage was done to roads, and the first cutting of alfalfa, a portion of which, still in the field, was damaged to some extent.

*Labor conditions.*—On the farms labor conditions were acute. Hay harvest and irrigation suffered from lack of help. Highway work continued to employ large numbers of men and teams, although full crews could not be maintained.

*Farming operations.*—On the farms June was a busy month. Haying, irrigation, spraying of fruit trees, cultivation of corn and potatoes employed all available forces. Crops are in excellent condition. A small amount of hay was sold for shipment, but, due to the uncertainty of the wool and live-stock market, feeders are reluctant to contract for their winter supply of forage. A small portion of the potato crop was contracted, but in general growers are holding for higher prices.

*Water supply.*—The precipitation during the month was above normal by 0.32 of an inch. The greater part of the rainfall fell during a period of a few hours and did not materially benefit growing crops. The run-off from Boise River was 30 per cent less than the June mean for the past 26 years. However, there was ample water to fill all requirements until the 26th, when it was necessary to draw a small amount of Arrowrock storage.

*Operation and maintenance.*—The Main Canal was operated to full capacity during the entire month. Between

the 15th and 26th, when haying was in progress, the drait on the lateral system was not heavy, but during the remainder of the month the system was operated to full capacity. Moss gave considerable trouble in some of the shallower canals and it was necessary to cut it in order to maintain the required deliveries. No serious breaks occurred during the month. Small crews were engaged in repairing structures and on general maintenance work.

*Construction.*—In the portion of the project now under operation several tap boxes and weirs were installed to take care of new land. On the Notus Canal a small force was employed on construction of bridges and on the suspended contract of William Long until the latter part of the month, when work was suspended on account of the shortage of funds.

*Drainage.*—Two drag line excavators worked two shifts each on the drainage system under the Big Bend and Riverside districts. One crew was engaged on the installation of structures. Good progress was made throughout the month.

*Surveys.*—Miscellaneous surveys were made in connection with the construction work in progress and on the irrigable areas within the constructed unit.

*Visitors.*—C. A. Piatt, examiner of accounts, was on the project from the 22d to the end of the month.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

June weather was pleasant and cooler than normal for this season of the year.

No construction camps were in operation. Two engineering field parties were engaged during the month on cross sections, profile, and location surveys where structures

are to be built during the coming construction season. The engineering and clerical forces were engaged on routine work.

The management of the King Hill Irrigation District maintained a successful delivery of water until the 13th of the month. A break occurred in the Idaho Power Co.'s flume above the head works of the King Hill Canal on the evening of the 13th, and water was not turned into the canal again until June 25. This suspension of several days resulted in considerable damage to the potato crop. It is believed that other crops were not materially affected.

C. E. Piatt, examiner of accounts, visited the project from the 17th to the 21st, and G. M. Williams, representative of the Bureau of Standards, visited the project on the 22d, inspecting concrete work installed during the past construction season.—*Walter Ward.*

#### MINIDOKA PROJECT, IDAHO.

The demand for water continued very heavy until about the end of June, when the demand slackened due to the beginning of the haying season. Three regular maintenance crews, consisting of four or five men each, were engaged in minor repair work to laterals and structures, ripping structures, destroying burrowing animals, and cutting moss. During the latter part of the month moss began to grow in the canals and in the slow-flowing laterals in sufficient quantities to obstruct the flow of water.

Office work consisted of the usual miscellaneous and routine work, hydrometric computations, and hydrographs estimates, preparation of 19th annual report, and preparation of information for the Appropriation Committee of Congress, which is to visit this project on July 18.

#### Crop report, Uncompahgre project, Colorado.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	23,457	Ton.....	68,931	2.9	\$13.40	\$923,860	839.39
Alfalfa seed.....	190	Bushel.....	739	3.9	14.84	10,968	57.72
Apples.....	2,191	Pound.....	7,143,600	3,260.4	.019	138,624	63.27
Barley.....	317	Bushel.....	6,291	18.1	1.70	10,706	30.84
Beans.....	174	do.....	2,766	15.9	4.10	11,340	65.18
Beets (sugar).....	1,703	Ton.....	14,018	8.2	10.03	140,633	82.58
Clover hay.....	28	do.....	18	1.7	10.67	512	18.29
Clover seed.....	149	Bushel.....	718	4.8	12.83	9,209	61.80
Corn (Indian).....	2,331	do.....	72,858	31.3	1.35	98,407	42.21
Corn, fodder.....	294	Ton.....	1,027	3.5	8.17	8,391	28.54
Corn, ensilage.....	433	do.....	3,752	8.7	8.58	32,189	74.34
Fruits, small.....	47	Pound.....	63,260	1,345.9	.081	5,136	109.28
Garden.....	118	do.....	do.....	do.....	do.....	11,434	96.90
Hay.....	402	Ton.....	1,059	2.6	6.83	7,240	18.01
Oats.....	6,500	Bushel.....	203,333	31.3	.82	166,788	25.66
Onions.....	187	do.....	79,368	424.1	1.18	93,521	500.11
Pasture.....	5,080	do.....	do.....	do.....	do.....	32,194	6.33
Peaches.....	76	Pound.....	391,100	5,146	.022	8,467	111.40
Peas.....	3	do.....	22,500	7,500	.04	900	300.00
Pears.....	2	Bushel.....	102	51	3.14	320	160.00
Potatoes, white.....	6,879	do.....	1,204,704	175.1	.93	1,122,565	163.19
Potatoes, red.....	41	do.....	975	22.2	1.52	1,486	33.77
Wheat.....	11,385	do.....	290,741	25.5	1.86	540,164	47.44
Miscellaneous.....	181	do.....	do.....	do.....	do.....	16,405	90.64
Less duplicated areas.....	2,455	do.....	do.....	do.....	do.....	do.....	do.....
Cropped.....	59,716	Total and average.....	do.....	do.....	do.....	3,391,456	56.76
Nonbearing orchard.....	65	Areas.....	do.....	do.....	do.....	Acres.....	Farms.....
Young alfalfa (no crop).....	4,395	do.....	do.....	do.....	do.....	82,226	1,526
Ground, fall plowed.....	3,166	do.....	do.....	do.....	do.....	60,906	1,526
Miscellaneous.....	530	do.....	do.....	do.....	do.....	60,906	1,526
Less duplicated areas.....	6,996	do.....	do.....	do.....	do.....	59,746	1,526
Total irrigated.....	60,906	Total irrigable area farms reported.....	do.....	do.....	do.....	82,226	1,526
		Total irrigated area farms reported.....	do.....	do.....	do.....	60,906	1,526
		Under rental contracts.....	do.....	do.....	do.....	60,906	1,526
		Total cropped area farms reported.....	do.....	do.....	do.....	59,746	1,526
							Per cent of project.



R. M. Patrick, assistant district counsel, spent part of his time going over the contracts for storage in American Falls Reservoir as to form, and advising the various contractors of additional information desired before contracts are ready for approval. At the end of the month 31 contracts for storage in American Falls Reservoir had been signed.

C. E. Piatt, examiner of accounts, visited the project from June 9 to 16, inclusive, and F. D. Pyle, former project manager of the Uncompahgre project, on June 10.

Discharge at Howells's ferry amounted to 693,530 acre-feet, as compared with 849,220 acre-feet for May. The total diversion to the project amounted to 143,655 acre-feet, being 87,495 acre-feet to the North Side gravity and 56,160 acre-feet to the South Side gravity, of which 43,885 acre-feet was pumped to the South Side pumping unit. The maximum amount of water in the North Side gravity canal was 1,496 second-feet; in the South Side gravity canal there were 990 second-feet, and 773 second-feet were pumped at the South Side pumping stations.

Wheat and alfalfa are above the average for this time of year; sugar beets and potatoes are being irrigated for the first time. Most grains will require only one more irrigation. Haying has commenced.—*Barry Dibble.*

#### HUNTLEY PROJECT, MONTANA.

June weather was about normal. Prior to the 17th, however, very dry weather prevailed. On this date 1.08 inches of rain fell; continued showers throughout the remainder of the month brought the total precipitation up to 2.54 inches. The labor situation was satisfactory and good progress was made in general operation and maintenance work.

Supplemental construction work was carried on by one crew, replacing turnouts, checks, and miscellaneous small structures. Two metal flumes were constructed, 350 and 210 feet long, respectively.

The demand for water was very heavy before the rain storm on the 17th, and the canal system was operated to capacity from the 10th to the 17th; during this period one unit of the auxiliary pumping plant was operated in connection with the gravity hydraulic plant. After the 17th only a nominal amount of water was used for irrigation purposes, and the canal was dry from the 24th to the 27th.

The general crop condition throughout the project remains excellent. On the 23d a heavy hail storm visited the larger portion of the project under the pumping system, causing about a 75 per cent loss in the district visited. The dry-land areas south of the project suffered a total loss of winter wheat crop.

*Drainage.*—All available labor was required for operation and maintenance work during the early part of the month, and no drainage was accomplished until the 25th when the construction of tile drain No. 32 was begun, and 1,225 feet were completed by the end of the month.

Willis J. Egleston, district counsel, visited the project on June 2, and Capt. F. C. Trowbridge, inspector for the Department of the Interior, from the 12th to the 14th. Other visitors were E. V. Wilcox, representative of the Country Gentleman, and G. F. Briggs, Fairbanks-Morse engine expert.—*Wm. M. Green.*

#### MILK RIVER PROJECT, MONTANA.

June weather was cool, and at Malta the precipitation was abnormally large, being 7.20 inches, which is the largest for June shown in our records since 1906, when the rainfall was 9.33. Other years of large precipitation in June were as follows: 1905 (the first year of our records), 3.80; 1909, 5.10; 1914, 7.07; 1916, 3.74. The precipitation at Nelson Reservoir, however, was only 3.80 and at Glasgow, 2.19. Most of the rainfall occurred from June 12 to 19, although there was 0.33 inch precipitation on the 23rd.

It follows that from June 12 to about the 25th conditions were poor for construction and farming work. Crops, however, are now in good condition, and the range especially fine. The first cutting of alfalfa commenced on the 26th and is now in full swing.

Abundant rains swelled Beaver Creek so that it overflowed its banks in the vicinity of Bowdoin on the 19th, and further down the valley at a shortly later date. Over 5,000 second-feet were flowing in Beaver Creek and the overflow channel at Bowdoin on the 20th. So far as is yet known, this flood caused little damage to any of the Reclamation Service works, but did some damage in drowning out crops; however, probably the largest damage will prove to be to the farmers' ditches and dikes in inundated areas.

Labor conditions were somewhat more favorable, and during the larger part of the month it was possible to secure enough men to fill the crews.

The Vandavia South Canal was in operation throughout the month, and the canals on the Malta Division to the 15th, delivering about 4,600 acre-feet of water to the farmers. The Dodson South Canal was also operated from the 27th to the end of the month as a feeder, delivering about 2,000 acre-feet to Nelson Reservoir. On the Chinook Division, the Fort Belknap, Paradise, and New Harlem, as well as the Agency Canal, were operated by their owners the larger part of the month; however, the natural flow of the Milk River was amply sufficient to serve these canals, and no St. Mary supplemental water was used by them during the month.

Construction work by contract was carried on when the weather permitted by four small earthwork contractors on lateral extensions in the vicinity of Beaverton. One of these contracts was completed and the others nearly so by the end of the month. Two small earthwork contracts were executed during the month, one for the V 83 lateral on the Glasgow Division. This involved 2,200 cubic yards and is to be built by the landowner, who will receive pay in the form of credits on his water-rental charges. The other is for the NS 9-50 lateral near Saco, involving 3,000 cubic yards; in this case, the landowners interested advance the funds for construction and receive credit therefor on their water-rental charges.

*Construction by Government forces.*—Construction of bridges, checks, turnouts, etc., on the lateral extensions near Beaverton, as well as one timber check on the Dodson South Main Canal and a number of wooden turnouts and measuring devices at scattered points on the project, were in progress when weather conditions permitted.

H. G. Hough, examiner of accounts, visited the project from the 19th to the end of the month.—*Geo. E. Stratton.*

#### ST. MARY STORAGE UNIT.

The first part of June was cold and backward with frequent showers and local storms, but the latter part was clear and warm.

Work was continued on the rebuilding of banks between Kennedy and Powell Creeks. The St. Mary Canal was operated during the entire month. A total of 28,455 acre-feet was diverted to St. Mary Canal and 21,766 acre-feet were delivered to the North Fork of Milk River. On the 24th the gates at Sherburne Lakes Dam were closed and during the remainder of the month 9,000 acre-feet were stored. Maintenance work consisted of raising and strengthening several weak banks and doing a small amount of protective work on the drops to Milk River. Due to the large amount of snow in the mountains the flow in the St. Mary River and its tributaries was at a reasonably high stage during the entire month and the indications are that they will keep up until late in the summer.—*R. M. Snell.*

## SUN RIVER PROJECT, MONTANA.

June weather was favorable for the farmers and stockmen. Range grass is in excellent condition and hay and grain crops look promising. Cut worms on Greenfields bench have caused some damage.

The only construction work was the completion of three small earthwork contracts on the Greenfields division under advertisement No. 1905 and finishing the back-filling by Government forces of structures built in 1919 under Specification No. 358.

Water was delivered continuously throughout the month on the Fort Shaw division, practically all of the laterals being operated. A maximum head of 200 second-feet was required in the Fort Shaw canal for about one week. The first water of the season was delivered to Greenfields bench on the 12th. Aside from an interruption of about six days, caused by a break in Greenfields Canal on the 15th, deliveries were continuous. A maximum head of 210 second-feet was delivered to the Fairfield drop. Deliveries were made to 94 users.

Maintenance work was continuous throughout the month. Four crews with men and teams were employed in the field and several small crews in charge of ditch riders were engaged in burning weeds and repairing structures.

One carload of implements, one of stock, and one of wheat were shipped from Fort Shaw.—*Geo. O. Sanford.*

## LOWER YELLOWSTONE PROJECT; MONTANA-NORTH DAKOTA.

The weather conditions for June, as in May, were favorable for farm work, maintenance of distributary system, and crops. The precipitation was only 64 per cent of the normal, but the showers came at intervals and in such a way as to make available sufficient moisture for plant growth. The nights were cool but free from frost, and the mean temperature of 63.3° was 1° below normal. There was only one hot spell which occurred for a few days during the second week of the month.

The first water delivery was made on June 2. The flow in the main canal was increased rapidly during the first 10 days. Due to the frequent showers it was necessary to decrease the quantity of water and at the end of the month the demand for water was about one-half that of June 10; 7,723 acres were irrigated. Water was delivered for the first time under a rotation schedule, which was very satisfactory. Many water users who have not heretofore been in favor of the rotation plan expressed themselves as being greatly pleased with this system of delivery.

All the unstable water banks and reaches of canal damaged on account of the cloudburst in 1918 appear to be in as good condition as any part of the canal. The only difficulty encountered in making water deliveries according to the rotation schedule was due to minor lateral breaks and decayed wooden drops which were promptly repaired.

The maintenance crew, which was larger than for several years past, was busily engaged the entire month in carrying on extensive repair work and cleaning the silt from the canal and laterals. Drag line excavator No. 1 started cleaning silt from the main canal on the 14th and moved down the canal one-half mile, and drag line excavator No. 3 completed the work of cleaning silt and debris in the Bell Hill reach and on the 18th started excavating the drain at Crane Creek; 1,060 feet of this drain was completed at the close of the month, representing 2,583 yards of material.—*L. H. Mitchell.*

## NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

June weather was generally favorable for construction work and for the growing of crops. Several showers occurred which helped the crops but did not delay the

progress on construction work. A heavy rain and hail storm passed over the Sheep Creek section on the 17th destroying some first cutting of alfalfa and damaging other crops. The mean temperature was one degree below the mean temperature for June.

*Operation.* The inflow at the Pathfinder Reservoir varied between 11,320 and 15,310 second-feet from the 1st to the 18th, at which time the storage was at the maximum, or 1,153,050 acre-feet. The average inflow was 11,129 second-feet. Water reached the spillway elevation on the 3d, and has been flowing over the spillway since that time, the depth of flow at the end of the month being 2.55 feet.

The diversion into the Interstate Canal was increased from 1,115 second-feet on the 1st to 1,540 on the 14th. The headgates at Whalen were closed at intervals between the 17th and 21st on account of damage to the canal banks at various places due to the heavy rains at that time. The damages were repaired with little inconvenience in water service to the farmers. The demand for water increased rapidly up to the middle of the month, when, on account of the numerous showers and the beginning of the hay harvest, the demand decreased. It was necessary to make deliveries on a rotation basis from the 9th to the 29th on the Interstate Canal system, and from the 14th to the 30th, under the Low Line Canal system, the delivery being four days on and four days off, with a head of 2 second-feet.

The average diversion into the Fort Laramie Canal was 617 second-feet. Of this amount 430 second-feet were wasted back to the river at the sand trap at Mile 0.6 and the wasteway at Mile 3.2. Water was delivered to 62 users during the month. Water was turned into the main Cherry Creek lateral for the first time and at the end of the month deliveries had been made as far down as Mile 14.1.

Water was delivered to 880 acres of land on the Northport unit under temporary arrangements completed for this season, whereby water is delivered to the west boundary of the district through the Tri-State Canal and waste ditch.

*Maintenance.*—Four breaks occurred in the banks of the canal systems as a result of the heavy storms during the middle of the month. None was serious and all were repaired with little loss to the farmers. Two large breaks occurred on the lateral system, about 2,000 cubic yards of material being washed out at each break. In addition to the usual routine maintenance work and the repairing of the large and numerous small breaks the forces in the first and second lateral districts replaced several wooden structures with concrete.

Monighan dragline No. 4 continued work on the enlargement of the Interstate Canal. The machine completed the widening of the canal to the Rawhide siphon on the 20th and crossed over and began strengthening the banks using material borrowed from the right of way. The machine moved 16,835 cubic yards of material during the month.

*Crops.*—The crops are in general in very good condition on a greater part of the project. The season has been favorable for the wheat and forage crops. The dry land wheat crop on the undeveloped portion of the Fort Laramie unit will be unusually large. The first crop of alfalfa is about 70 per cent harvested and the yield is very good. Grass in the grazing sections is unusually good.

*Drainage.*—On the Interstate unit work was continued on the additional construction work on the Lower Nine Mile outlet drain. The corrugated iron siphon to carry the Bayard Canal under this drain was completed and the water turned through on the 29th. The cleaning of silt from the Bayard Canal was completed and also the excavation of the Wrangler Lateral on its new location. The east bank of the outlet drain was built up with a top width of 20 feet and a height sufficient to carry a runoff of 800



second-feet. Monighan dragline No. 2 was employed on this work, moving 17,202 cubic yards of material during the month. Dragline No. 3 started on the excavation of the Dunham-Andrews drain on the 9th, but was stopped by the landowner. Excavation was resumed on the 14th under instructions from Washington. During the working period this machine moved 5,670 cubic yards of material.

On the Fort Laramie unit electric dragline No. 2 continued work on the Cherry Creek drainage system, the principal excavation for the month being on Branch A leading to the wasteway at mile 39.9 on the Fort Laramie Canal; 0.76 miles of drain was excavated involving 18,004 cubic yards of class 1 and 905 cubic yards of class 2 material.

*Construction.*—Storage unit: Work was continued on the driving of the new tunnel for the new North Tunnel outlets. Slow progress was made on account of the unfavorable working conditions due to high water and on account of the difficulty of securing competent labor. Work was begun on the anchorages and framing of towers for the cableway across the canyon.

Interstate unit: The construction of the five-room house in Mitchell was completed.

Fort Laramie unit: Electric dragline No. 1 continued work on the lower end of the Springer Lateral excavating during the month through very rough country. The machine was operated with two shifts daily and excavated 28,650 cubic yards of material from 0.96 mile of lateral. Dragline No. 3 continued work on the Fort Laramie canal between station 4629+45 and station 4598. The machine was operated with two shifts daily and excavated 34,613 cubic yards of material. Dragline No. 4 continued work on the lower end of the Horse Creek Lateral operating with one shift daily until the 21st when a second shift was added. This machine excavated 24,225 cubic yards of material from 1.04 miles of lateral. Dragline No. 5 completed all excavation on the upper end of the Horse Creek Lateral on the 10th and was thoroughly overhauled and repaired preparatory to moving to begin work on the the Fort Laramie Canal east of Horse Creek. During the working period this machine moved 21,845 cubic yards of material.

During the month the powder crew, averaging 6 men, drilled 2,021 linear feet of holes and used 136 pounds of dynamite and 4,790 pounds of T. N. T. in blasting classified material ahead of draglines Nos. 1, 3, and 4.

The check at mile 45.1 of the Fort Laramie Canal was completed.

Work was continued on the construction of the structures on the Cherry Creek Lateral system. On the main lateral the backfilling on siphon No. 1 was completed and also 2 checks, 1 sublateral turnout, 2 farmers' weirs, and 1 farm turnout. On the sublaterals, 28 drops, 2 road crossings, 2 checks, 9 turnouts, and 8 weirs were completed.

Northport district: An elevating grader outfit operated by Government forces was started on the 21st on the construction of fills on the Northport Canal. The main excavation will be done with electric draglines. Work was continued on the construction of structures ahead of the excavation. The permanent camp at Indian Creek was practically completed.

*Power plant operation.*—The Lingle power plant was operated continuously throughout the month with three shifts daily. The total power generated was 123,065 k. w. h. Of this amount 24,900 k. w. h. were delivered to the city of Torrington, Wyo. The construction of the transmission line to furnish power to the town of Lingle, Wyo., was completed on June 30.

*Surveys.*—Interstate unit: The operation and maintenance field party were engaged on miscellaneous hydro-

graphic work, irrigable area investigations and lateral locations and extensions. The drainage field party furnished lines and grades for the construction work and made location surveys for the Dunham-Andrews, Pickering, and Dutch Flats drains.

Fort Laramie unit: The three field parties were engaged on routine work of staking structures and furnishing lines and grades for the draglines.

Northport district: The field party made investigations of the alternate lines for tunnel or open-cut construction on a section of the Northport Canal and also to determine the method of crossing the West Indian Creek draw.

*General.*—F. E. Weymouth, chief engineer, and James Munn, consulting engineer, arrived on the project on the 22d to consider matters in connection with construction work on the Fort Laramie and Northport units and to meet the House Committee on Appropriations who arrived on the project early on the 24th. This committee is making a tour of investigation of the projects of the Reclamation Service and the National Parks. A large body of representative men of the valley met the committee and accompanied them on their trip of inspection over the project.—*H. C. Stetson.*

*Prevailing crop prices at close of June, 1920.*

Project.	Alfalfa hay, per ton.		Bar- ley, per ushel.	Oats, per bushel.	Wheat, per bushel.	Pota- toes, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	\$18-\$22	\$23-\$27	\$1.62	\$1.22	\$2.82	\$6.00
Yuma.....	20.00	25.00				
Orland.....	20.00	25.00	1.38		2.46	
Grand Valley.....	20.00	24.00	1.60	1.40	2.55	4.20
Uncompahgre.....	15.00			1.20	2.50	3.00
Rose.....	15.00	20.00	1.50	1.40	2.10	6.00
King Hill.....	20.00	26.00				6.90
Minidoka.....	15.00	20.00	1.75	1.17	2.19	1.80
Huntley.....						
Milk River.....	30.00	35.00	1.12	1.01	2.51	9.00
Sun River.....		40.00	1.09	1.00	2.52	4.20
Lower Yellowstone..	30.00		1.15	1.15	2.65	5.00
North Platte.....						
Newlands.....	19.00					
Carlsbad.....		26.00				
Rio Grande.....						
North Dakota pumping.....						
Umatilla.....	18.00					
Klamath.....	25.00	35.00	2.10	1.12	2.10	
Belle Fourche.....			1.92	1.30		6.00
Strawberry Valley..	25.00	29.00	2.50	1.60	3.00	7.50
Okanogan.....						
Yakima:						
Sunnyside unit..	18.00	23.00				4.50
Tieton unit.....	18.00	23.00				4.50
Shoshone.....						5.40
Blackfoot.....	30.00		1.06	1.00	2.53	
Flathead.....						
Fort Peck.....	30.00			1.12	2.80	7.20
Riverton.....						

NEWLANDS PROJECT, NEVADA.

June weather was favorable for all project work.

On June 26 the House Appropriations Committee visited Fallon and inspected the project. Other notable visitors accompanying the committee were Chief Engineer F. E. Weymouth, E. O. McCormick, vice president of the Southern Pacific Co.; J. M. Fulton, traffic manager, Southern Pacific Co.; and United States Senator Charles B. Henderson, from Nevada.

The director and the chief engineer remained in Fallon until June 27, and were then accompanied by the project

manager to Reno, where inspection was made of a Truckee River storage reservoir site.

**Construction.**—The only contract work in progress consisted of earthwork on the Gault Lateral, schedules I to IV, inclusive, by Meister Bros. This work was practically completed at the end of June.

Government forces completed the earthwork in the reconstruction of the E and F Lateral systems, completed the Marke Lateral, and partially completed the Buck Lateral.

Minor timber structures installed in the lateral system consisted of 15 turnouts, 12 checks, 7 drops, 3 culverts, 1 bridge, and 2 miscellaneous structures.

The project shops were operated for drag line, tractor, and miscellaneous equipment repairs. Work of installing a steel 10,000-gallon gasoline tank at the project yards was in progress.

**Settlement.**—Numerous prospective settlers made inquiry concerning project lands.

**Water supply and use.**—Water available in the Truckee River at the head of the Truckee Canal dropped from 679 second-feet on June 1 to 154 second-feet on June 24. Owing to the shortage of water from this source one unit of the Lahontan power plant was operated from the Lahontan Reservoir starting June 23, and on June 26 all three power units were operated from the reservoir. Heavy precipitation in the Truckee watershed on June 28 and 29 increased the river flow to 1,057 second-feet on June 30. The elevation of Lake Tahoe remained low, with no storage secured or available for the United States. At the end of the month storage in Lahontan Reservoir amounted to 195,370 acre-feet.

**Operation and maintenance.**—Growth of moss in some of the laterals made necessary the drying up of certain ditches; otherwise water deliveries were made without interruption.

Maintenance work was confined largely to cleaning of certain ditches, using draglines, and to removing moss from laterals and canals. Dragline excavator No. 2 cleaned and enlarged the LD lateral over a length of 5,074 feet. Dragline No. 3 cleaned the LB lateral for a distance of 2,195 feet and a portion of the B<sub>2</sub>X lateral.

Cleaning of the L drain in the Carson Lake district was continued between stations 108+00 and 15+00 with dragline No. 4. This work will be completed in about a week.

Numerous culverts, bridges, and minor timber structures were repaired by the maintenance force.

At the end of the month 1,910 head of stock were in the Carson Lake pasture.—*John F. Richardson.*

#### CARLSBAD PROJECT, NEW MEXICO.

June weather was fair and warm, accompanied by occasional showers, and was ideal for growing crops, although some hay was damaged by rain. The growth of all crops was very satisfactory. The precipitation during the month amounted to 2.07 inches.

The demand for water was very light until after the middle of the month, when it gradually increased and at the end of the month the demand was about 500 acre-feet per day. The average diversion of the main canal until after the 15th was about 150 acre-feet per day; after that date the average was about 300 acre-feet per day. Both reservoirs were full during the entire month. During the first half of the month considerable water was wasted. One maintenance crew was employed in cleaning ditches during the entire period. The regular crew was employed in repairs on A and D-1 closed drains; these repairs were made necessary by irrigation water breaking into the tile. At the end of the month the regular crew was sent to Lake McMillan to repair a gyp hole which developed at a location very close to the gates, the water escaping into

the outlet channel. No serious trouble is anticipated at this time at that point.

The total run-off of the Pecos River for the month at the Dayton station amounted to 71,400 acre-feet; the daily average was 2,380 acre-feet. The minimum flow of the Pecos River was 750 acre-feet and the maximum 5,360 acre-feet.

The first crop of alfalfa hay was being harvested nearly all month; delay was occasioned by shortage of labor and occasional showers. The price of alfalfa hay averaged from \$20 to \$25 per ton, depending on grade. Considerable hay was damaged by showers, and a serious shortage of cars made it necessary to stack hay in bales on many of the farms. Cars were still scarce at the end of the month, and it has therefore been impossible for the farmers to realize much on their first hay crop. The second crop of hay was ready to cut on many of the farms at the end of the month. There were 128 cars of alfalfa hay shipped from the project during the month. Some cotton was planted after the first of the month and the condition of the crop was much improved at the end of the month, although shortage of labor delayed the chopping materially, and some fields are still in bad condition, due to the growth of weeds and Johnson grass. The stand of cotton was probably a little above normal. A completion of the crop census at the end of the month showed a total area in crops of about 23,100 acres, of which about 6,500 was in alfalfa and 15,300 acres in cotton. About 95 per cent of the cotton is Durango, a long-staple variety.—*L. E. Foster.*

#### Project weather during June, 1920

Project.	Station	Temperature, F.			Precipitation (inches).
		Maxi-	Mini-	Mean.	
Salt River	Phoenix, Ariz.	110	61	84.4	T.
Yuma	Yuma, Ariz.	112	64	85.2	T.
Orland	Orland, Calif.	109	47	76.1	0.12
Grand Valley	Grand Junction, Colo.	92	46	70	.39
Uncompahgre	Montrose, Colo.	91	42	64	.42
Boise	Boise, Idaho.	96	35	64	1.19
King Hill	Glenns Ferry, Idaho.	102	36	62.8	.02
Mudokan	Burley, Idaho.	95	27	61.8	.37
Huntley	Ballantine, Mont.	90	31	62.6	2.54
Milk River	Malta, Mont.	88	31	63.4	7.20
St. Mary storage	Near Babb, Mont.	78	37	60	1.29
San River	Fort Shaw, Mont.	87	31	58.1	1.40
Lower Yellowstone	Savage, Mont.	95	33	63.3	2.01
North Platte	Wyncole, Wyo.	92	33	63	1.02
Newlands	Fallon, Nev.	97	35	65.9	.23
Carlsbad	Carlsbad, N. Mex.	99	51	.....	2.07
Rio Grande	El Paso, Tex.	100	57	87.4	.99
North Dakota pump-	Williston, N. Dak.	90	37	65.3	3.5
ing.					
Umatilla	Hermiston, Oreg.	96	37	64.9	1.03
Klamath	Klamath Falls, Oreg.	91	37	60.5	.65
Belle Fourche	Orman, S. Dak.	95	46	68.2	4.57
Strawberry Valley	Provo, Utah.	88	29	63.3	.06
Okanogan	Omak, Wash.	101	34	65.1	.26
Yakima					
Sunnyside unit	Sunnyside, Wash.	99	35	63.5	.72
Teton unit	Cowiche, Wash.	92	35	60.3	.17
Shoshone	Powell, Wyo.	87	32	60.2	.64
Indian projects:					
Blackfoot	Browning, Mont.	78	30	48.7	.29
Flathead	St. Ignatus, Mont.	86	30	55	1.70
Fort Peck	Poplar, Mont.	93	34	63.2	2.00
Riverton	Pavillion, Wyo.	.....	.....	.....	.....

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

The first part of June was very cool for that month. It warmed up in the latter part, yet the average temperature was 2.2 degrees below normal. However, a rainfall of 0.99 inch, nearly twice the average, was of great benefit to the crops, which look fine.



The inflow into the reservoir during June amounted to 862,285 acre-feet, which makes a total storage of 2,093,000 acre-feet, forming a lake 40 miles long, with a water depth of 178 feet at the Elephant Butte Dam. It is expected that during July water will flow through the spillway gates for the first time.

For four days water was turned out of the La Union Canal to remove the sand. About 30 teams were employed and about 5,000 cubic yards of sand were removed.

During the month 100 feet of brush riprap was placed.

The sand in the head of the Franklin Canal has been the cause of considerable trouble. Crews were employed throughout the entire month to prevent the wasteways from silting up and to keep a supply of water in the canal. Water wheels propelled by the current were constructed in the canal to keep the sand moving. The sand in the canal was the result of heavy rains in the hills, which increased the flow of water in the river, causing the sand to begin sloughing.

The wheat is about all harvested. Considerable cabbage is being shipped from Las Cruces. The second cutting of alfalfa is now being harvested and promises a much

better yield than the first cutting. Cotton and other crops are generally in good condition. Pear picking and packing will begin in the El Paso Valley about July 5, and it is expected that about 80 carloads will be shipped.

The annual meeting of the Dona Ana County Farm Bureau was held at the State college, at Mesilla Park, on June 12, and Judge A. S. J. Eylar was elected president. The attendance was large.

Construction work on the project progressed almost entirely on the drainage feature, lateral work being carried on only by one dragline excavator working one shift on the construction of the Rogers lateral in the Island district of the El Paso Valley. One 1-T Monighan excavator, working in the Rincon Valley, excavated 20,540 cubic yards in 1,800 feet of drain. In the Mesilla Valley four Bucyrus  $1\frac{1}{2}$  cubic yard machines and one Monighan 2-T excavator moved 125,284 cubic yards in 3 miles of drain. In the El Paso Valley the one Bucyrus machine working on drainage excavated 11,629 cubic yards, being delayed a considerable portion of the time by lateral reconstruction and structure work.—*L. M. Lawson.*

*Crop report, Rio Grande project, New Mexico-Texas, year of 1919.*

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	29,819	Ton.....	79,296	2.7	\$21.40	\$1,697,212	\$56.90
Alfalfa seed.....	156	Bushel.....	394	2.5	14.56	5,737	36.75
Apples.....	451	Pound.....	559,400	1,240	.041	23,784	52.75
Barley.....	789	Bushel.....	17,059	21.6	1.50	25,651	32.50
Beans.....	863	do.....	14,531	16.8	2.83	41,077	47.60
Beets, sugar.....	10	Ton.....	73	7.3	5.07	370	37.00
Cabbage.....	303	do.....	2,462	8.1	20.00	49,250	162.54
Cane.....	4,387	do.....	13,357	3	9.5	127,060	29.00
Cantaloupes.....	996	Crates.....	288,064	289	.55	158,450	159.10
Chili.....	23	Pound.....	152,600	6,640	.021	3,165	137.60
Clover hay.....	11	Ton.....	33	3	15.00	495	45.00
Clover seed.....	16	Bushel.....	80	5	10.00	802	50.00
Corn, Indian.....	11,700	do.....	274,763	23.5	1.45	399,209	34.10
Corn fodder.....	328	Ton.....	1,298	4	4.78	6,211	18.95
Corn, sorghum, seed.....	38	Bushel.....	435	11.5	1.93	840	22.10
Corn, sorghum, cane.....	163	Ton.....	163	1	12.50	2,030	12.45
Cotton.....	1,584	Pound.....	592,020	374	.40	237,755	150.10
Cotton, seed.....	1,584	Ton.....	592.6	.37	40.00	23,703	14.95
Cucumber seed.....	13	Pound.....	1,031	79	.61	630	48.45
Flowers.....	6	do.....	156,400	1,057	.09	1,600	266.65
Fruits, small.....	148	do.....	156,400	1,057	.09	14,550	98.30
Garden.....	2,313	do.....	156,400	1,057	.09	211,043	91.25
Hay, miscellaneous.....	293	Ton.....	532	1.8	12.25	6,518	22.25
Millet, seed.....	10	Bushel.....	400	40	1.00	400	40.00
Milo maize.....	30	do.....	900	30	1.67	1,500	50.00
Oats.....	769	do.....	23,650	30.8	1.30	30,720	39.95
Onions.....	10	do.....	1,840	184	2.28	4,188	418.80
Pasture.....	4,655	do.....	1,840	184	2.28	61,003	13.10
Peaches.....	162	Pound.....	545,900	3,370	.056	30,439	187.80
Pears.....	750	do.....	2,680,500	3,573	.032	86,000	114.70
Potatoes, sweet.....	640	Bushel.....	49,388	77	1.30	64,194	100.30
Prunes.....	7	Pound.....	18,900	2,700	.019	357	51.00
Pumpkins.....	15	Ton.....	2	.13	30.00	60	4.00
Rye.....	110	Bushel.....	2,555	23.2	1.86	4,748	43.15
Tomatoes.....	250	Pound.....	2,500,000	10,000	.01	25,000	100.00
Watermelon.....	42	do.....	2,500,000	10,000	.01	4,175	99.40
Wheat.....	11,535	Bushel.....	232,061	20.1	2.05	475,181	41.20
Less duplicated areas.....	2,809	do.....	232,061	20.1	2.05	475,181	41.20
Cropped.....	72,170	Total and average.....				3,825,107	53.00
		Areas.			Acres.	No farms.	Per cent of project.
No crop, miscellaneous.....	4,863	Total irrigable area farms reported.....			149,600		
Total irrigated.....	77,033	Total irrigated area farms reported.....			77,033	3,065	
		Under rental contracts.....			74,177	2,896	
		Total cropped area farms reported.....			72,170	2,934	

## NORTH DAKOTA PUMPING PROJECT.

June weather was unseasonal, and the first half of the month cold, with all crops late and backward. The weather was not unfavorable, however, for the work in hand, which was the usual class of maintenance work. There were 3.5 inches of precipitation, which was 0.7 inch below normal, and leaves 0.81 inch above normal to date this year.

Labor conditions continued unusually difficult. To maintain a force of about 40 men, 100 men were engaged, showing unusual restlessness and inefficiency. Wages remained high.

Due to the late and cold season, irrigation operations did not commence until June 11, the irrigation district planning to add 10 days to the latter end of the season to compensate for the 10 days' delay in opening.

The water conditions in the coal mine continued bad, but at the close of the month the electric mine pump was connected and began the unwatering of the mine; 1,388 tons of coal were mined during the month.

The power plant was operated for the commercial power contract; 75,350 kilowatt-hours of electrical energy were delivered to the city of Williston. This represented a decrease of 5,345 kilowatt-hours over last month and an increase of 4,429 kilowatt-hours of the corresponding month of last year.—*Wm. S. Arthur.*

## UMATILLA PROJECT, OREGON.

Cool weather prevailed throughout June, accompanied by several showers.

*Farming operations.*—The first crop of alfalfa hay was harvested during the month and 51 cars shipped. Due to the frequent showers which prevailed the first part of the month some of the hay was damaged in harvesting. The crop yield was a little below normal.

*Labor.*—Conditions were not especially difficult, although the farmers found it necessary to pay considerably above the scale of former years. Practically no construction work was being performed by the service and ample labor was available for operation and maintenance activities.

*Operation and maintenance.*—The feed canal was operated throughout the month until the morning of the 30th, when water was cut out by order of the water master for the Umatilla River. No water was delivered to the reservoir, and but a continuous head of 25 second-feet to the Echo Mills. At the close of the month there was a total storage in Cold Springs Reservoir of 38,700 acre-feet. As the month closed heavy diversions from the reservoir were being made for irrigation, although water supply conditions on the Umatilla River made possible a heavy operation of the Maxwell Canal throughout the greater part of the month. It is expected that the demand for water will increase steadily throughout the coming month.

The main canal for the west extension diverted from 100 to 125 second-feet from the Umatilla River continuously throughout the month. By the introduction of rotations and other economies in the use of water the available supply has been adequate for the demand.

Three small crews were employed throughout the month on general maintenance and small construction work.

*Construction.*—1,516 linear feet of 20-inch concrete pipe and two turnouts were made during the month.

*West side.*—The installation of the ram at the Three-mile Falls patrolman's quarters was completed during the month.

*Visitors.*—Among these were John H. Lewis, ex-State engineer of Oregon; Aubrey Perry, water master of the Umatilla River; District Counsel H. L. Holgate; Assistant District Counsel Darwin G. Tyree; and Mr. Wilcox, of the Country Gentleman.—*Maurice D. Scroggs.*

## KLAMATH PROJECT, OREGON-CALIFORNIA.

June was generally favorable for the growth of crops, although the growth of alfalfa was retarded somewhat by cool weather. In the early part of the month the demand for water was comparatively light. Toward the end the demand increased and with the exception of the main canal the entire system was being operated to capacity. During the latter part of the month several canals were dragged with heavy chains to remove algae.

The County Farm Bureau has waged a vigorous campaign against gophers and grasshoppers, the latter appearing in large numbers at several places on the project during the early part of the month. Due to the prompt measures adopted and the splendid cooperation on the part of the farmers, little damage was done to crops by the grasshoppers. The result of the campaign against the gophers is manifested by a marked decrease in their numbers.

Labor conditions show a slight improvement. Wages are from \$4.50 to \$5 per day for common labor.

One survey crew consisting of an assistant engineer and three men was employed on Tule Lake topography and on miscellaneous work.

Four small crews have been engaged in general maintenance work. A few small breaks occurred at several points in the system which were quickly repaired. During the month 30,547 acre-feet of water were diverted, about one-half of which was delivered to the farmer.

The Monighan dragline excavator completed the ditch for the Pine Grove District on the 10th, after which the machine was engaged in moving to the Pettit drain.

E. C. La Rue and C. F. Holbrook of the United States Geological Survey, water resources branch, were on the project all month in connection with the water supply of the Klamath River basin.—*Herbert D. Newell.*

## BELLE FOURCHE PROJECT, SOUTH DAKOTA.

June weather was unseasonably wet. The roads were almost constantly so soft as to be practically impassable for heavy loads. Twice during the month rains were so heavy in the Vale district as to fill up the South Canal and cause damage at the break near the lower end, which it had not yet been possible to repair. Toward the latter part of the month a severe hailstorm visited the southeasterly portion of the project causing almost total destruction of the crops on a number of farms.

Labor was more plentiful than previously, although the price remained high. A great many teams came in from the dry land country looking for work. It was impossible to use many of them, however, as the laterals were too wet.

On account of copious rains well distributed throughout the month, none of the canals were operated. Maintenance work was pushed as rapidly as possible, but was materially hindered by constant rains which rendered banks of canals too slippery to climb. Practically all of the damage done during the May floods to the main canals has been repaired; a small force of approximately 30 head of horses is still at work bringing low places up to grade and making the dangerous places safe. Small laterals have been constantly saturated from rains and it has been impossible to do any cleaning. Maintenance crews worked out from Orman, Vale, and Newell and were able to repair structures on small laterals so that as soon as ditch banks are dry enough to permit work these canals will be put in shape quickly for operation. On the South Canal considerable work was done putting in drain tile along critical sections of the bank and in strengthening weak places. The heavy rains earlier in the season washed considerable material into this canal at various places, particularly in the vicinity of the tunnel and Anderson siphon. It is planned to defer



cleaning out any except absolutely essential places, however, until a dragline excavator is available. Work progressed very slowly on the replacement of the town-site lateral siphon owing to impossibility of keeping water out of the open trench. All tile have been made with 14 additional to replace certain units that showed signs of checking; 68 out of 125 that are required have been laid and collars placed. It is now anticipated that the siphon may be completed before it becomes necessary to deliver water to lands below.

Crops on the project look very promising, although a considerable portion of small grain is only recently up. The acreage of grain planted is materially less than would have been sown had conditions been favorable early in the season. Corn is growing nicely, but generally needs cultivation. Farmers had just begun cutting the first crop of alfalfa at the close of the month. This crop bids fair to be more than usually good, although about 10 days late.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

*Weather conditions.*—June was generally fair and warm, with practically no precipitation.

*Farming operations.*—The unusually dry and warm weather materially assisted the growth of all crops and increased the demand for irrigation water. The cutting of the first crop of alfalfa was started about the 15th and indications are that the crop is excellent.

The harvesting of the pea crop has begun and the canning factories are in full operation.

The cherry and strawberry crops are about picked, with excellent prices prevailing.

The condition of the sugar beets is excellent and indications point to a good yield. The thrashing of the fall wheat is about to begin and the condition of the crop throughout the project is very good and average yields are expected.

*Hydrographic data.*—The High Line Canal on the last day of the month was flowing 235 second-feet and during the month a total of 10,587 acre-feet was delivered to the High

Line unit for irrigation purposes. On the last day of the month the flow of water in the Spanish Fork River was about 240 second-feet, so that the demand for Strawberry water by the five Spanish Fork canal companies was very little, and only 754 acre-feet of Strawberry water were delivered to the Spanish Fork unit during the month. The Mapleton and Springville irrigation districts took 470 acre-feet of water during the month. The total amount of water delivered from the project to the various units was 11,856 acre-feet, of which amount 3,023 acre-feet was water taken from the Spanish Fork River.

*Labor.*—Conditions were about average and no particular scarcity existed in any class and could be obtained readily whenever required.

*Operation and maintenance, storage system.*—Two hundred and ninety feet of 18-inch tile drain were laid away from the lower toe of the downstream slope of Strawberry Dam for the purpose of carrying away the seepage water and to prevent the accumulation of water against the lower slope of the dam during periods of discharge over the spillway.

The usual operation and maintenance work was done in connection with Indian Creek and Trail Hollow feeder canals. The flow of water through the Strawberry Tunnel started on June 7. The run-off season in Strawberry Valley ended about the 15th, during which time the elevation of the reservoir reached 7,556.6, or about 1½ feet below the spillway crest.

New lignum-vitae bearings for the 14-inch turbine at East Portal were received.

*Operation and maintenance, power system.*—The power plant was operated without interruption and power furnished to the towns of Payson, Salem, Spanish Fork, and Springville.

The new runners and shafts arrived during the month and the alterations and changes to No. 2 generator unit were made and tried out on the last day. The encroachment of Spanish Fork River on tunnel No. 1 was taken up with the Denver office. The telephone line between East Portal and West Portal was reset and new poles put in where necessary.

#### Crop report, Belle Fourche project, South Dakota, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	24,804	Ton.....	54,928	2 21	\$20.00	\$1,098,560	\$44.30
Alfalfa seed.....	842	Bushel.....	1,795	2 13	15.00	26,925	32.00
Barley.....	1,351	do.....	44,897	33 20	1 50	67,345	49.80
Sugar beets.....	978	Ton.....	19,537	10 78	10.00	105,370	107.80
Corn.....	2,903	Bushel.....	63,756	21 94	1 50	95,634	32.90
Corn fodder.....	394	Ton.....	948	2 41	15.00	14,220	36.10
Garden.....	410	.....	.....	.....	.....	32,220	78.60
Native hay.....	3,290	Ton.....	3,458	1 06	25.00	87,700	26.60
Oats.....	3,665	Bushel.....	78,284	21 38	80	62,597	17.10
Pasture.....	6,922	.....	.....	.....	.....	88,134	12.75
Potatoes.....	118	Bushel.....	8,079	68 10	2 00	16,078	136.40
Rye.....	51	do.....	5,570	11 20	2 00	1,140	22.40
Wheat.....	10,742	do.....	119,707	11 12	2 20	263,355	24.44
Miscellaneous.....	168	.....	.....	.....	.....	3,495	20.25
Total cropped.....	56,638	Total and average.....	.....	.....	.....	1,962,683	34.65

Areas.	Acres.	Farms.	Per cent of project. <sup>1</sup>
Irrigable area farms reported includes			
2,955 acres seepage.....	75,860	1,000	77.5
Irrigated area farms reported.....	56,638	1,000	57.8
Under water-right applications.....	56,638	.....	57.8
Cropped area farms reported.....	56,638	1,000	57.8
Total irrigated.....	56,638	.....	.....

<sup>1</sup> Based on 97,916 acres.

*Settlement.*—During the month 6 water-right applications were received and accepted, 5 of which were new applications and 1 supplemental.

*General.*—A new contract between the United States and Springville City for furnishing electrical energy has been approved. Form of special contract for increasing the irrigable area under the High Line unit was approved. The question of the cancellation of the Springville Canning Co's contract for power is being considered.

Negotiations with landowners under the proposed Santaquin pumping plant for the sale of 2,000 acre-feet of water were continued and on the last day of the month word was received that negotiations had failed.

Two boards of engineers were convened at Provo during the week of June 7; one for the inspection of Strawberry tunnel and the other to consider and review a proposed extension of the project to cover lands in east Juab County.—*W. L. Whittemore.*

#### OKANOGAN PROJECT, WASHINGTON.

For the greater part of June the weather remained cool with many cloudy days. This condition was ideal for the preservation of moisture, but near the end of the month the weather turned warm and dry and all of the project orchards and other crops began to show signs of drought. The records at the Omak station show  $\frac{1}{4}$  inch of rain, while the precipitation for Conconully was 5.11 inches.

The first irrigation was completed about the middle of June and a second irrigation started on the 29th. Many of the water users received water every two weeks, but the subscribed water rights receive water only once each month, with only a small flow at that time.

The emergency work in connection with the power and pumping plants was practically finished at the end of the month. The three wells, the generating plant, the Duck Lake pumping plant, Spring Coulee well plant, and Salmon Lake pumping plant were all operating. The installation of the two pumping plants at Riverside were started near the end of the month and progressing very favorably. At the close of the month the first installation was practically ready for operation. A start has been made on the well at the Diversion weir, which has been sunk to water, the engine foundation has been poured, and the plant is now waiting for the sinking pump and engine and a crew of men to proceed to the digging.—*Calvin Casteel.*

#### SALMON LAKE DAM.

The weather during June remained cool until the last week of the month, when a very hot spell was experienced. The precipitation for the month was slight except for heavy local showers on June 14.

Labor was available in the nearest cities, but it has been found difficult to get men on the job and keep them.

The steam shovel on Salmon Lake Road handled 1,185 cubic yards of class 1; 3,259 cubic yards of class 2; and 1,061 cubic yards of class 3 material. The shovel was subject to frequent delays for rock blasting.

Two hundred and twenty-eight cubic yards of concrete were placed in the lining of the feeder canal to Salmon Lake Reservoir, completing the canal to borrow pit for embankment material at the north end of the Salmon Lake Dam.

Due to the use of the steam shovel on road work, only a small crew was employed on Salmon Lake Dam, placing during the month 1,103 cubic yards of gravel in downstream drain trench and as a base for riprap, and 4,720 cubic yards of earth embankment.

At the end of June, after having pumped this season 657 acre-feet of water from the westerly section of Salmon Lake, the Salmon Lake pumping plant was being dismantled preparatory to moving to the site on the easterly portion of the lake.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for June was below normal, but the weather was exceedingly hot at the close of the month. Precipitation was very light.

*Operation and maintenance, Sunnyside unit.*—Delivery of water for irrigation was continuous. As the weather became warmer the demand for water steadily increased, the diversion into Sunnyside Canal at the close of the month being approximately 1,200 second-feet, the average diversion for the month being about 1,140 second-feet. The operation of the several pumping plants was continuous, being interrupted only for short intervals when necessary to clean the units. Deliveries to the irrigation districts averaged for the month as follows:

<i>Irrigation district.</i>	<i>c. f. s.</i>
Outlook.....	46
Snipes Mountain.....	18
Grandview.....	36
Prosser.....	17.5
Sunnyside.....	19

*Tieton unit.*—Water delivery was continuous and sufficient for all needs, except on Unit 1, where failure of small concrete pipe lines caused some delays, but in nearly all such cases delivery was made up before the end of the month. The average diversion for Tieton Canal was 309.5 second-feet, this being all taken from Tieton River, with no diversion from Cowiche Creek. Maintenance work consisted of repair of pipe lines on the sublateral system, cutting of weeds, etc., and painting of patrol houses.

*Investigation and surveys for new units.*—No field work in progress. Report and estimate of cost was forwarded to the directors of the Kennewick Irrigation District on June 10. Contract providing for continuation of surveys and preparation of plans for the Moxee unit was executed by the Yakima Irrigation District on June 7. Similar contract for work on the Roza unit was presented to the Yakima-Benton Irrigation District on June 23 for execution by its board of directors.

*Cooperative investigations, Pasco project.*—Field investigations on soil survey and determination of water duty, which were undertaken on March 8, under cooperative contract with the State of Washington, were continued.

*Storage unit.*—The force was increased and work continued on clearing timber and brush from the reservoir area at Lake Keechelus, and good progress made, the force at the close of the month consisting of 48 men and 9 teams. Contractor S. G. Harlis had 3 sets of fallers and a donkey crew of about 10 men, engaged in felling timber under his contract of January 24, 1920.

At Lake Cle Elum, the Lake Cle Elum Lumber Co., under contract of May 3, 1920, continued cutting timber.

At Rimrock (Tieton Reservoir site), the Northern Pacific Lumber Co., under contract of May 3, 1920, operated the sawmill, but did not make satisfactory progress in disposal of the logs.—*L. J. Lytel.*

#### SHOSHONE PROJECT, WYOMING.

June was cool with little precipitation. The snow is leaving the mountains gradually, and no high flood has yet occurred in the river. Due to the cool spring weather crop growth is slow; alfalfa production is below normal, but grains are doing well. Sugar beets are late, but in good condition.

*Water supply.*—Shoshone Reservoir was filled on the 13th, rising 15.4 feet from the 1st to that date, and since then water has been discharging over the spillway with a maximum depth of 3.9 feet on the 25th.

*Operation and maintenance.*—The canal system was operated the entire month; 27,622 acre-feet were delivered



in 1,509 deliveries, to irrigate about 46,459 acres. The total amount diverted from the Shoshone River was 43,445 acre-feet, at a maximum rate of 925 second-feet. Maintenance work consisted mainly of the operation of the Monighan dragline on Frannie Canal, cleaning about 1 mile of canal, miscellaneous work on minor structures, and riprapping and channel protection on various canals.

*Crops.*—There was practically no crop movement during the month, all farmers being engaged upon farm work. At the close of the month the first alfalfa cutting was beginning. Some offer of new hay was being made at \$15 per ton in the field.

*Drainage.*—On the Garland division the Austin trencher worked on closed drain 26-1, making 2,600 feet; progress was slow because the work was mostly in quicksand formation, requiring continuous cribbing. At the end of the month the machine moved to closed drain 26-2, as further progress on 26-1 was impossible. The Lidgerwood dragline completed moving to open drain X of the Dry Lake area, and began excavation the 9th, making 4,500 feet of progress during the balance of the month. On the Frannie division the Bucyrus continued the excavation of Howell drain the entire month. One survey crew was engaged on investigation and drain location during the month.

*Field and office engineering.*—With the exception of the work of the crew above mentioned, work from both the Powell and Deaver offices was carried on only by part-time crews, and consisted of miscellaneous work connected with construction. In the Powell office an engineer from the designing division of the Denver office revised the plans for a new headquarters' office building. Other office work was routine.

*Settlement.*—Frannie townsite lots were offered for sale at a public auction on the 15th; 46 lots were sold out of 202 lots offered. One original homestead entry was made during the month.

*Construction.*—Government forces on the Frannie division were occupied on completing extension of the lateral system to private lands, the Sage Creek crossing of the Frannie Canal, and miscellaneous earthwork on that division. Near the last of the month a crew started work on the supplemental water supply of the Deaver Canal from Sage Creek.—*J. S. Longwell.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

The first part of June was rather cold with frequent showers and local storms. The latter part of the month was clear and warm, and was very favorable for crop growth.

Work on the enlargement of Two Medicine Canal was continued with a drag-line excavator. The Two Medicine, Badger Fisher, and Birch Creek systems were operated. At the end of the month the Two Medicine Canal was being operated to capacity, there being a demand for all the water that could be furnished; the other canals were being operated to only about half capacity, except Four Horns Supply Canal, which was being operated to full capacity to provide storage in Four Horns Reservoir. Crops during the first part of the month were rather backward, but due to more favorable weather conditions during the latter part of the month most crops at the end of June were making excellent growth.—*R. M. Snell.*

##### FLATHEAD PROJECT, MONTANA.

Construction work was continued during June on the spillway of McDonald Lake Dam and finishing slopes to required lines. Excavation of Pablo Feeder Canal was resumed and excavation of Mission A laterals was com-

pleted. Concreting of Jocko E Canal was discontinued with a total of 377 linear feet for the month and 1,529 feet to date. All construction work was done by Government forces.

About 11,000 acres were irrigated and about 6,800 acre-feet delivered. Another break occurred in the Camas A Canal, which had not been wholly repaired at the end of the month.

The condition of the crops and live stock is good.—*E. A. Moritz.*

##### FORT PECK PROJECT, MONTANA.

June weather was cool with 15 days when there was a small amount of precipitation. There were only seven clear days and the cloudy weather helped to conserve the moisture; grain crops did very well.

Construction work was carried on at the Big Porcupine Storage Dam and the fore apron was completed. At Big Muddy unit work was continued on the construction of the siphon and wasteway and bridges. The manufacture of lock-joint pipe was begun and pipe was available for the turnouts and culverts which will be constructed during the coming months.

Water was delivered under the Poplar River, Little Porcupine, and Big Porcupine units. Storage water was used altogether on the Little Porcupine and Big Porcupine units. Owing to the cloudy weather and favorable conditions for crops, the demand for irrigation water was small.—*R. M. Conner.*

##### RIVERTON PROJECT, WYOMING.

The temperature during June was slightly less than normal. The precipitation was confined to showers, including one heavy cloudburst near Pavillion. The roads continued to be rough in places, but were otherwise in reasonably good shape for hauling.

Dragline No. 1 was operated for two shifts from June 1 to 6, and 21 and 22, and for one shift during the remainder of the month. During the latter period the second shift was employed in repairing dragline No. 2. The total amount of excavation moved during June was 12,744 cubic yards, of which 2,605 cubic yards were excavated outside of the canal prism.

One truck was engaged in hauling and distributing telephone poles throughout the month.

Plans were made for the erection of a telephone line and for construction on an enlarged scale after July 1.

James Munn, consulting engineer, visited the project on June 28 and 29.—*H. D. Comstock.*

#### GENERAL OFFICES.

*Washington office.*—The director was in charge of the office during most of the first half of June. On the 19th he was married and left immediately for the West, spending a portion of his time with the Congressional inspection party. During his absence the office was in charge of Morris Bien as acting director.

The chief counsel was in the office during the entire month.

On June 30 E. E. Roddis, district counsel, Denver, Colo., arrived for consultation on various legal questions.

*Denver office.*—The chief engineer returned from Washington, D. C., on June 5, and was in the Denver office until June 21, when he left with Consulting Engineer James Munn to visit the North Platte project, at which point he joined the Congressional Appropriation Committee and from there accompanied them to the Newlands project. Assistant Chief Engineer R. F. Walter was in the field at the beginning of the month and during June visited the Uncompahgre, Grand Valley, and Strawberry Valley projects. Assistant Chief Engineer Chas. P. Williams was in the Denver office during the entire month.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

HON. JOHN BARTON PAYNE, Secretary of the Interior.  
ALEXANDER T. VOGELSANG, First Assistant Secretary.  
SELDEN G. HOPKINS, Assistant Secretary.  
CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
JOHN HARVEY, Assistant to the Secretary.  
E. J. AYERS, Chief Clerk.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamele, chief counsel; J. B. Beadle, director's assistant; C. J. Blanchard, statistician; Hugh A. Brown, editor; E. C. Bebb, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk; F. G. Hough, Yakima, Wash., and C. E. Piatt, Denver, Colo., examiners of accounts.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD LEGAL OFFICES.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement; R. M. Patrick, district counsel located at Burley, Idaho.

**Denver, Colo.**—Law section office of chief engineer: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr, district counsel. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauff, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Ballantine, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; C. C. Hogue, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont. E. E. Chabot, chief clerk; J. T. M. Culbertson, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melaas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Rothi, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweek, chief clerk; L. H. Kline, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, acting project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—P. J. Preston, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Schepplmann, chief clerk; E. M. Philebaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

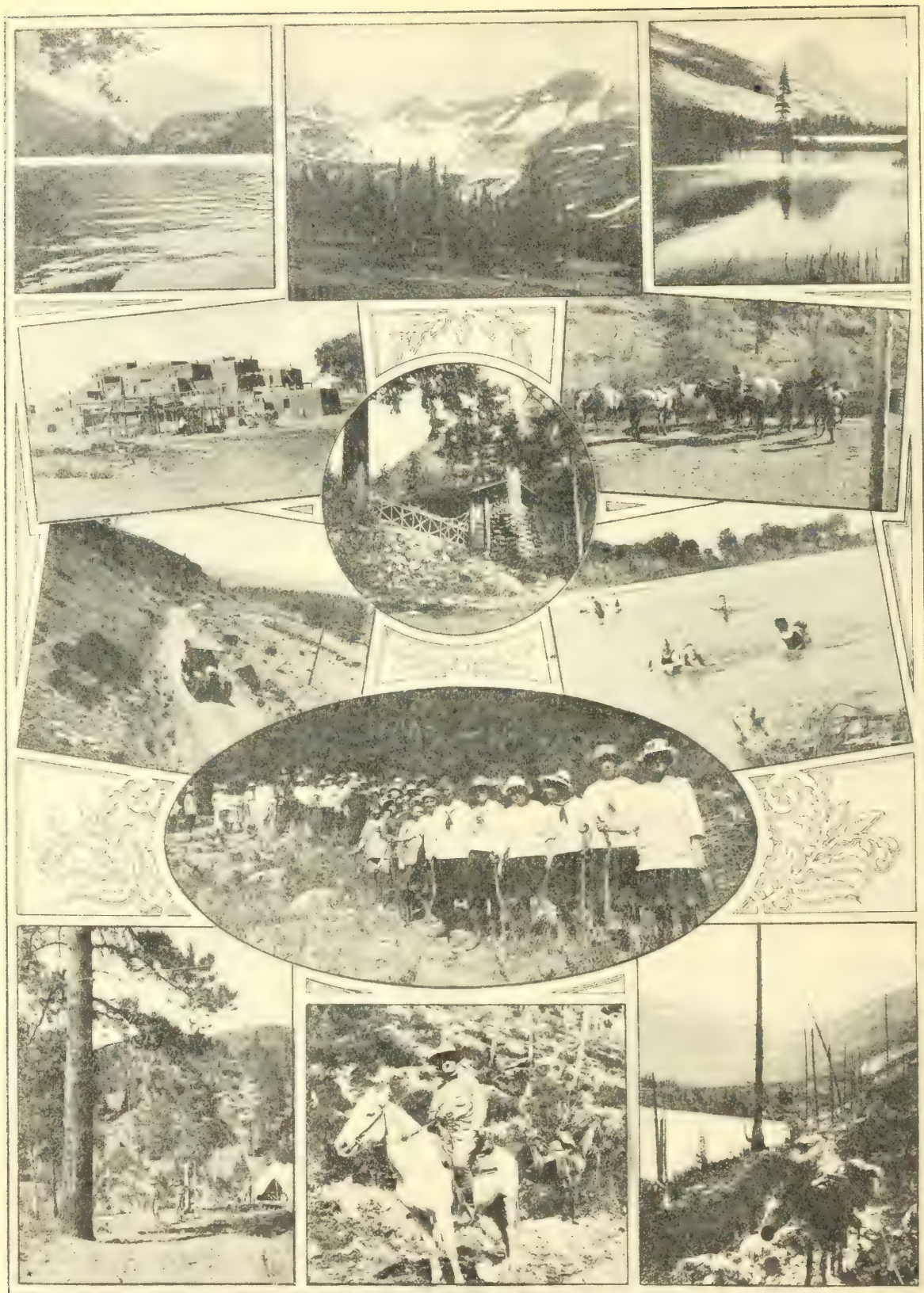
**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton Wyo.; G. H. Baird, chief clerk and fiscal agent.

## WORK AND SAVE. BUY GOVERNMENT SECURITIES







# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

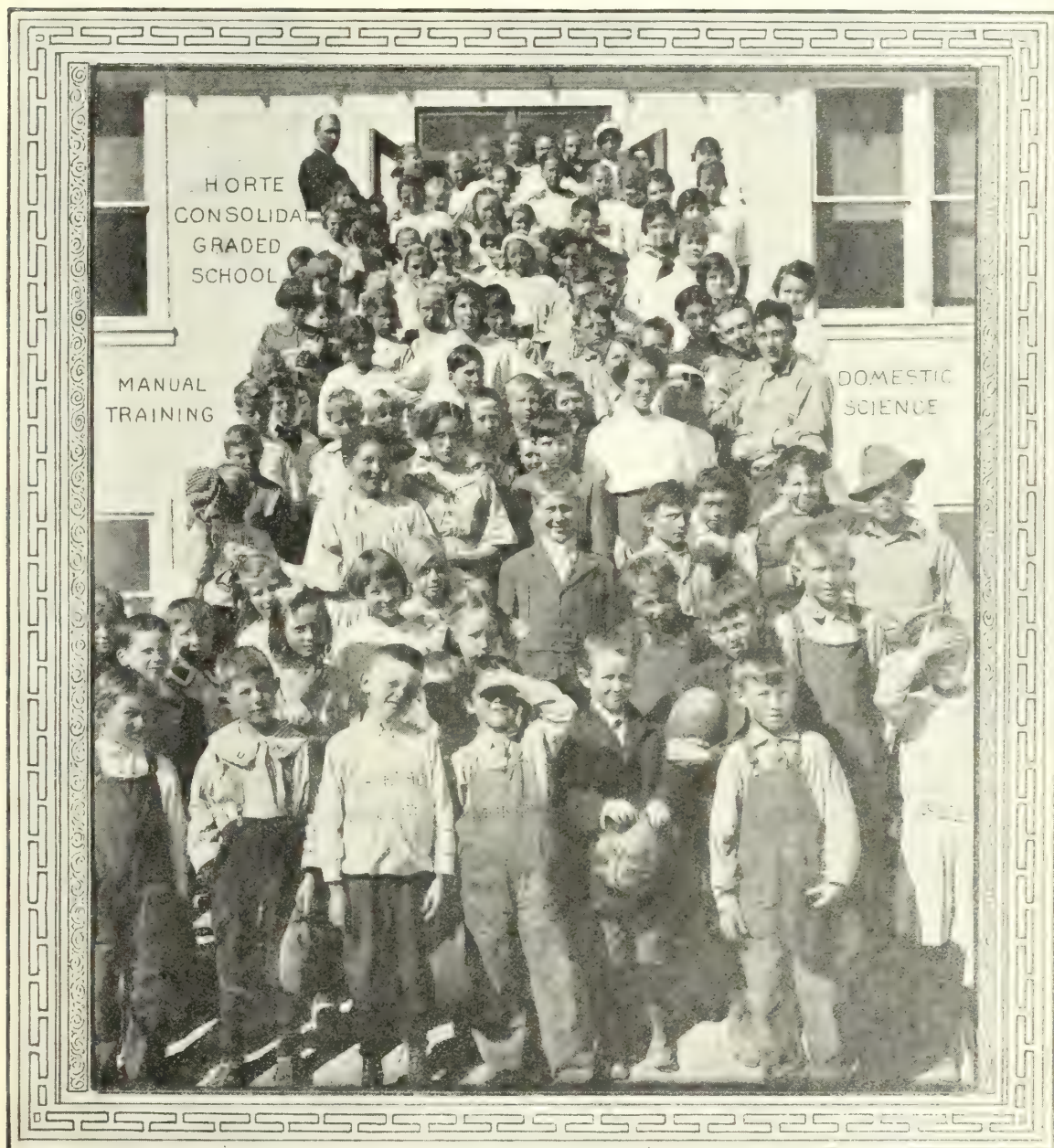
**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURER INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

VOLUME 11, No. 9

PRICE {NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

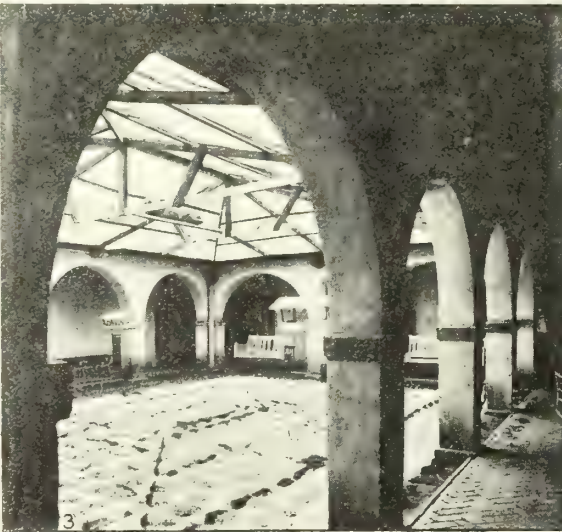
SEPTEMBER, 1920







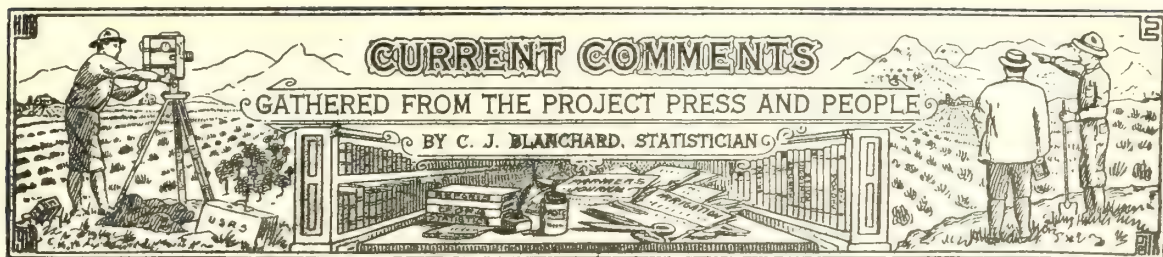
- 1 A TRANSPLANTED  
NEW ENGLANDER'S HOME  
ON THE OKANOGAN PROJECT,  
WASHINGTON.
- 2 WIDE VERANDAS ARRANGED  
FOR SLEEPING PORCHES  
ARE COMMON AMONG THE HOMES  
OF THE ORLAND FARMERS,  
CALIFORNIA.



- 3 SCREENED PATIO  
OF RESIDENCE IN MESILLA VALLEY,  
RIO GRANDE PROJECT,  
USED AS AN AVIARY  
AND HOUSING SONG BIRDS  
OF MANY KINDS
- 4 WHERE THE SOIL  
FURNISHED THE BUILDING MATERIAL  
ADOBE RANCH HOUSE,  
MESILLA VALLEY  
NEW MEXICO







Convincing evidences of the prosperity of the people of our desert region are found in the decided improvement which has taken place in the character of the homes on the farms and in the rapidly growing towns of these new agricultural districts. Love of home, the compelling influence that led them to this rainless land, has waxed stronger and stronger with the desert's generous response to the industry and skill of the settlers. In these virile communities much thought is being given to the beautification of the permanent homes which are replacing the shacks of pioneer days. The new homes express the best in modern architecture and construction. Comforts and conveniences once only dreamed of are now enjoyed. The downward rush of forest-born streams generates cheap electricity, which lightens the burdens of the farmer and his wife and adds greatly to the joys of country life.

Largely the dwellings follow the bungalow types of southern California. In the Southwest the tendency is along the lines of old Spanish architecture. This is true especially in New Mexico and Texas in the historic and tragedy-strewn pathway of the Friars. The bungalows are of many styles, giving a pleasing variety to the landscape. Most of them have wide verandas, screened and arranged for outdoor sleeping. The majority have all modern conveniences. A windmill, or an electric pump, supplies the big tank from which water is piped to the home and stable. Thousands of farm homes in the West are equipped with appliances for electric heating and cooking, conveniences quite unknown in older farming sections.

Another evidence of the exaltation of the home is found in the exterior and its immediate surroundings. Clambering vines adorn the porches, lawns are well kept, and roses and other flowing shrubs show the good taste of the housewife. The varieties of trees best suited to the region have been set out and already cast their grateful shade. On driveway and along the main roads the consistent tree-planting campaign which set in a few years ago has greatly transformed the flat and uninteresting landscape of the desert. Good roads, graveled, macadamized, or concreted, link the towns and the country and carry comfortably an increasing stream of automobiles. With improved facilities for transportation the next important step followed quickly, and the schools of the towns and country were consolidated. The little red schoolhouse

on the hill has become merely a polite fiction. In its stead, or rather in lieu of the legion of squat, insanitary one-room buildings with a single teacher responsible for the whole school, cooperative consolidated graded and high schools, located in the town or in the center of a populous farming district, have been erected. In the schools located in towns the children of both city and country rub elbows together. In the morning autobusses or horse-drawn vans gather the children of the countryside and in the evening return them to their homes.

These schools mark a long forward step in our educational methods. Manual training, domestic science, elementary agriculture, and lectures illustrated with motion pictures and slides, are included in the curriculum of most of them. The lure of the city wanes as the country child has frequent opportunity to compare the advantages of his own life in the open with that of his chum in the town. Woman's clubs, girls' and boys' clubs, producing and marketing organizations for the men, each in its way is helping to make country life wholesome and sufficient. Each offers opportunity for the expression and reception of the best thought of the neighborhood. We are a gregarious race, and until the country people find a means of more frequently gratifying this instinct, the efflux to the city will continue.

Dwellers in the desert have attacked the problems of country in a practical way. Isolation and loneliness, twin curses of the big-farm region, have no place on Government irrigation projects, with a maximum of 160 acres per farm and an average of less than 60 acres.

Under the conditions now obtaining in the irrigated regions the threat of farm abandonment, which looms so darkly in other sections, causes slight concern. Too much wealth and the increased rentals offered are more to be feared. Where the farm owner can lease his land for \$30 to \$50 an acre per annum, the temptation to loaf is hard to resist.

The towns and young cities of the desert have not fallen behind in the march of progress. In civic improvements they have kept abreast of the country, and in some instances have forged strongly ahead.

If we dwell lightly on the achievements of only a few of these it is not to be understood that many others not mentioned are undeserving of equal credit. Space is too limited to cover this wide field even



slightly. Much of what is written of the places named herein applies with equal force to a large number of the desert's growing towns.

To mention Yuma, Ariz., in this connection will surprise most readers, yet Yuma, the most maligned city in our country, is rapidly donning a garb of beauty. You will find here, if you seek, patios crowded with flowers of every hue and homes almost hidden amid a tropical vegetation. Here the date palm flourishes, the orange, lemon, and grape fruit, and fig attain perfection. Long-staple cotton has made the grower rich. On the mesa now opening to development the Government recently sold 5,000 acres, at an average price of \$225 an acre, including the water right. We shall hear more and more about Yuma in the near future.

Phoenix, the beautiful seat of government of the young State, has risen from the burning sands of the Salt River Valley panoplied in vernal robes and infused with the spirit of conquest. Her citizens have visioned the coming metropolis and are building accordingly. There is a fine civic spirit here. They are a prideful people, and rightly so, for Phoenix is to-day one of the most charming cities of the desert, as well as one of the most prosperous. The state-house grounds rival those of the National Capitol in arboreal decorations. In the business sections the development has been amazing. The residential sections partake of the beauty and charm of Riverside, Calif.

El Paso, a few years ago a struggling village of rude adobe, and belonging to the land of Manana, has attained commercial and financial greatness. With faith in her destiny to be the largest city in the Rocky Mountain territory, her citizens have adopted an advanced constructive policy of city planning. The rocky hills have been smoothed and terraced, broad avenues of easy gradient have been extended to the summits, and subdivisions have been developed in all directions. It is a city of homes growing at an amazing rate.

Scottsbluff, Nebr., city of the Great Plains, long a typical frontier village, has grown by leaps and bounds in the midst of its fertile valley. Its commanding commercial position is attested by the enormous tonnage shipped from this point, the second largest in the State. The business center is admirably planned, and in the character of the buildings the town ranks with others having twice the population. Hundreds of comfortable and attractive homes of frame and brick grace the well-shaded streets, reflecting the splendid spirit of the people.

Rupert and Burley, twin towns on the Minidoka project, in Idaho, are inspiring examples of the progressive spirit of the West. Rupert is located in a Government town site, the sale of lots occurring in 1907. Its population is probably 2,500, while that of Burley is about 4,500. Both towns were established in the middle of a forbidding desert, and their

development, remarkable as it is, has not exceeded that of the land about them. One of their chief claims to notoriety is the extraordinary utilization of electricity. Practically every store and residence is heated and lighted with the harnessed power of Snake River. It is unnecessary to state that the power is from a Government plant. In the homes the same magic force does the cooking and numerous other things. With such unequaled advantages it was but natural that home building should follow along modern lines. Out of the silent desert these towns sprang suddenly, but their builders were men of vision and of high ideals, and their works are enduring and attractive. Each of these towns boasts of its schools, electric lighted, heated, and ventilated. Where else will you find such?

Boise, the capital of Idaho, scene of successive gold-mining booms in the days of the Argonauts of the Oregon trail, is now one of the beautiful cities of the West. Nature's kindness in providing an inexhaustible supply of hot water has in part solved for her the problem of fuel. The riches of mines and forests, of lands and stock have been expended lavishly in the numerous handsome homes of her citizens.

Yakima, Wash., on the eastern front of the Cascades, close to the lakes of the sky, is the largest and most attractive of our northwestern desert cities. The culture and refinement of her people, most of whom are college bred, are evidenced in countless charming homes in broad, well-shaded avenues, flower-strewn parkways, and beautiful lawns. The lure of Yakima Valley is irresistible, once you have seen it. Land of the big red apple, the luscious pear, the delicious cherry, gem of all the Government projects, the blessings of a benign Providence surely are thine. The kindly earth each year returns a sure and prodigious harvest, and the organized producers count their annual reward in terms of millions. The famous orange groves of California are not more valuable than many of the better orchards of the Yakima project.

Great Falls, Mont., is the center of electric power of the State. From the turbines churning the swift rushing waters of the Missouri River the wheels of transcontinental trains are propelled, factory and store are supplied, and homes made light and cheerful. This city of potential greatness is a noble example of the wisdom of careful and intelligent planning. Like our National Capital, Great Falls represents the practical as well as the esthetic thought of a single individual. Paris Gibson, a former United States Senator, a quarter of a century ago visioned the city of to-day. Unlike Washington, his plan was never changed. In the passing of time it has grown in beauty, unmarred by the alterations which unwisely have been made in the city designed by L'Enfant. Great Falls has capitalized the home-loving instinct by affording sufficient ground for a real home.

Grand Junction, metropolis of the western slope, in a land of fruitage and flowers, invites you to linger in its atmosphere of contentment born of well-doing and well-being. Amid the glories of its lofty mesas and snow-capped mountains that feed the never-failing stream flowing through it, with its great veins of coal darkening the near-by cliffs, with a climate ideal and a soil responsive, what wonder that optimism fills the hearts of the people who dwell here.

In terms of equal praise we should justly speak of Orland, Klamath Falls, Okanogan, Carlsbad, Belle Fourche, Williston, Las Cruces, Mesa, Hermiston, Provo, Nampa, and others. In each of these the spirit of conquest of the desert has energized the thought and action of the people, and finds expression in service to each other and to the community in which they live.

From out the West comes only a booming, cheerful note. It is a pæan of victory over desolation, for reclamation is a triumphant reality:

No fairer land  
No land more beautiful  
Has earth's thrilled bosom lifted to the sun  
Since God began the building of the hills.

NOTED HERE AND THERE.

*Colorado, Grand Valley project.*—This valley has assumed its customary air of hustle with the advent of harvest for many of its varied crops. The big canneries are belching forth smoke and the highways are crowded with trucks and wagons bringing in the crops. First came the beans, tender, succulent, and stringless; then the big, juicy, red tomatoes. Thousands of cases of the canned products of this valley find ready market all over the country, their superior quality and flavor winning for them a popular place everywhere.

It will be good news to all who know the supreme quality of Colorado potatoes to learn that the crop this year will be greater than that of last year. Having been "fed up" on the poorest lot of spuds ever marketed, and having paid more for these than for oranges, the East will rejoice at the prospect of once more obtaining the real thing.

*Idaho, Minidoka project.*—Snake River Valley is waking up to the fact that only by united and well-directed effort can it hope to realize the hope of early construction of the big project of harnessing the Snake. The responses to the call of the Community Club to get together and pull together are quite favorable, and indications are flattering that before fall the towns in the valley will be united as one in pushing the movement. The Community Club, however, will not attain its full strength until it has succeeded in drawing into its membership the leading farmers of the valley. The banker and merchant are expected

to be active in the operations of the club because they appreciate the importance of reclaiming the vast areas of desert which surround their towns, but the chief beneficiaries are the landowners whose broad acres, once assured ample water, will become a constant source of wealth to them.

As an instrumentality for genuine and permanent good the Community Club as planned may readily become most powerful if all industries and interests are united in its membership.

The daily mail of the statistician indicates a widespread interest in this region, although the movement to consolidate the land and water organizations is in its infancy. The announcement that actual work has been initiated is certain to bring an avalanche of inquiries from homeseekers. A protracted delay in unifying the valley is sure to be costly. Only those projects which are organized and united can hope to secure early consideration. It must not be overlooked that similar organizations are forming elsewhere for the purpose of bringing forward the merits of their respective projects, and with the urgent and nation-wide cry for economy and lessened appropriations only those projects which are backed by unanimous community sentiment can hope to receive recognition. In other words, it will be impossible to secure funds for construction where the exasperating and time-wasting work of organizing and unifying the landowners must yet be accomplished. The history of many reclamation projects shows that two and often five years have elapsed before actual construction began because of inability to perfect the organizations of landowners.

*Nevada, Newlands project.*—There was a period in the history of the Lahontan Valley when the worst things said about it came from its own citizens. The concert of knockers for a while exceeded in volume the din of a big boiler factory in full blast. The echoes of that anvil chorus of complaint and fault-finding are still heard in other parts of the land, although the lusty song birds which promoted it are all relegated to the limbo of the dodo. Just now the valley is singing another song, and we admit we find it a lot more harmonious than the first one. It is a song of cheerfulness, and it is accompanied by a spirit of doing that is rapidly pushing the valley to the front, where it belongs. For 15 years we have persisted in telling the world that Lahontan Valley in soil, climate, and ideal living conditions was deserving of consideration. We have sent hundreds of land-hungry folks to look it over, and many stayed to prove the truth of our statements. Many more would have stayed but for the contention and strife which met them on every hand. Development of business and occupancy of land were delayed, and the loss to the people and the State has been enormous. The lies about the valley which were spread



broadcast will not die out quickly. Recently we read a book by an eminent writer and an article by another in a prominent periodical arguing that the national policy of reclamation was a failure and using the Newlands project as the horrible example.

If the present hustlers in the valley stay on the job another five years we shall be most disappointed if the project is not classed among the big successes of the service. Real teamwork will do it, in fact, is doing it right now. While the Idaho project farmer with potato, beet, and alfalfa land is finding buyers at \$500 per acre, the Newlands farmer with equally good soil and a milder climate is asking \$200. Why? On the first-mentioned project the community, united and strong, is working out its problems in complete harmony with the Government. Is that the answer? On the first the farmers pulled together and got three sugar factories, canneries, storage warehouses, and marketing associations. Did that help any? We'll say it did.

*Washington, Yakima project.*—Yakima Valley continues to march swiftly forward, and to-day is in the lead of other projects in the matter of land values. In the early boom days of the valley the promoters with glib tongues portrayed a future of luxury and ease for the fruit growers, and a cosmopolitan class was lured here. For many these prophecies proved illusions, and the early history of the valley was strewn with tragedy and heavy financial losses. In the latter the land agent suffered with his victims. Without practical knowledge of horticulture and laboring under difficulties in the way of water shortage, poor canal systems, and no markets, failures were inevitable. It is pleasing to note to-day that past dreams have finally come true. Cooperation in every line of endeavor, experience gained through adversity and failure, have finally overcome the obstacles to success. National reclamation has conquered the erratic Yakima River, great dams have converted the mountain lakes into dependable storage reservoirs, and with the assurance of water in abundance and when needed, the industry and skill of the Yakima farmer are being rewarded generously. The sun shines in no more favored spot in all our fair land, and the swelling chorus of the successful farmer is proving irresistible to many of our citizens from all parts of the Nation. Recent sales of orchards place the Yakima Valley in a class with the famous citrus-bearing districts of sunny California. During the past year numerous transfers have been made at prices ranging from \$1,000 to \$2,000 per acre. Among recent sales is that of the 10-acre apple orchard of George Alexander to Andrew Field, of Minnesota, for \$18,000.

Chairman Good, of Iowa, of the House Committee on Appropriations, who, with a number of other distinguished members of this important committee, has

been making a tour of the projects this summer, after a short flight through Yakima Valley, said:

"I am satisfied that the one thing to do first and foremost, as rapidly as we can be sure the money will not be wasted, is for the Government to carry on the reclamation of waste lands which are capable of producing as are the lands of the Yakima Valley. The reclamation act, it seems to me, should be amended until it is as comprehensive as the farm-loan act. Reclamation work should go on as rapidly as money is available for it."

In this statement the chairman voiced the hope and prayer of every citizen in 15 Western States and of innumerable of our Nation's heroes who are anxiously waiting for opportunities to make their homes on the western lands as soon as reclamation is undertaken. If the Appropriation Committee can bring about an expansion of the reclamation act in line with the suggestion of the distinguished chairman, the hopes of thousands of veterans of the World War which were dashed when Congress failed to pass the soldier settlement bill, will be revived.

Director Davis, whose admiration for the Yakima Valley has often been expressed, said:

"I still consider the Yakima project the finest example of the work of reclamation, and after the congressional party has been over it I am convinced that they will have had a potent argument in favor of reclamation development."—C. J. B.

### HOW RECLAMATION AIDED YAKIMA VALLEY.

In the course of a speech in the House of Representatives on June 5, 1920, Representative John W. Summers, of Washington, said:

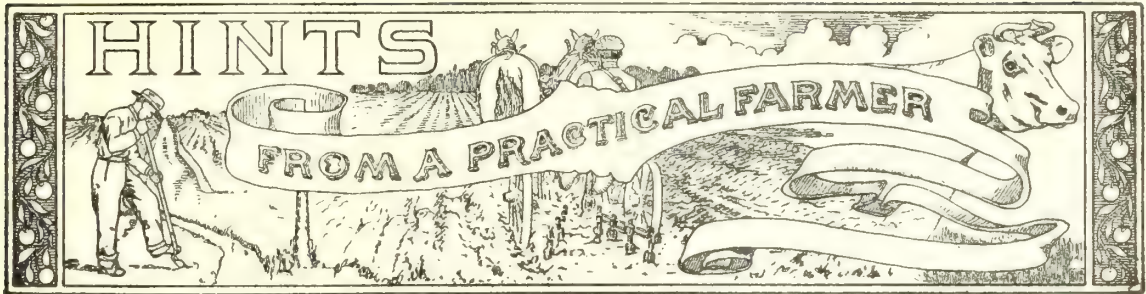
"The value of the crops harvested in the Yakima Valley last year is conservatively estimated, according to reliable figures which I shall shortly quote in detail, at \$45,602,576, and I am here to say that had it not been for the passage of the reclamation act of June 17, 1902, and the subsequent reclamation work in that valley by our Government, the value of its crops last year would have been reduced about \$40,000,000.

"Here, then, we have a concrete example of forty millions in one year added to the country's production and wealth as a result of Federal reclamation work on the arid lands of one county in my district."

Some agricultural questions were being put to a class of small girls in a Berkeley school.

"How would you water a horse, Lucile?" asked the teacher.

"I would get a ladder, climb up and pour a pail of water on him," was the quite sufficient though wholly original reply.



### Refill the Silo.

S. P. Clark, extension agronomist of the University of Arizona, says:

"Keep the silo working all winter. The silage crop should be planted in the spring or summer. If the farmer does not have sufficient silo capacity to feed his cattle all winter he should plant enough so that he can refill the silo at least once or twice through the feeding season.

"The silo should be filled when the crop is ready to harvest in the fall and the balance of the crop should be cut or shocked for later filling. In filling the silo with dry fodder a ton of water will be needed for every ton of fodder used to replace the water lost in the dry plant. Silage will be 50 to 100 per cent better than dry feed and there will not be the large percentage of waste that always results when fodder is fed.

"If the field where the silage crop is grown is needed for wheat or winter pasture the fodder can be hauled in and stacked or shocked close to the silo, where it will be handy at refilling time."

### Better Yield of Alfalfa.

"Maintain the life of the alfalfa field" should be the motto of every farmer that can grow this valuable crop, according to S. P. Clark, extension agronomist of the University of Arizona.

Under the present system of handling alfalfa it is considered necessary to plow the field every 8 or 10 years, because it is unprofitable to let it stand longer. Quite frequently this is true because of wrong methods of handling the field, allowing the foxtail or some other noxious weed to encroach on the field. Where there is a thick stand there is no reason why alfalfa fields can not be kept in a high state of production for 20, 30, or more years.

Because of its rapid growth and the frequency of cutting, alfalfa can smother out almost any crop that may try to secure a foothold in the field. The present practice is to cut the crop when one-tenth in bloom, and for the man who buys the hay this is best; but if early cutting is practiced for several years the field will gradually become weaker, allowing weeds to

enter, and in a few years the field will need to be plowed up. Experiments also prove that for total tonnage over a term of years the best yields have been secured when the crop is cut in full bloom. The crop at this time contains the largest amount of available protein.

Alfalfa, like every perennial plant, has to store up reserve food in the large taproot, in order to renew its next growth when the crop is removed. If the crop is immature when cut the plant has had no opportunity to get a reserve of food, so it is a heavy drain on its vitality to put forth new growth. Cutting on the same side of the field each time should not be practiced, as this does not give the plants a chance to maintain their strength.

### Sudan Grass.

Sudan grass is being successfully grown in nearly all parts of the United States. It does not serve well either as a "money crop" or a soil improver, hence it may never find a permanent place in regular crop rotations. It has, nevertheless, a very important place in the farmer's second line of defense as a catch crop which can be planted to give satisfactory returns when conditions have brought failure to other hay crops.

Sudan grass is replacing millet as the premier catch crop in many localities because of its ability to produce a fair yield and a high quality of hay under conditions of low rainfall, its rather short growing season, and its ability to thrive on a wide range of soil types. Large yields of Sudan grass are obtained only on good soils, but the grass fails completely only on cold, poorly drained land.

Sudan grass produces heavily. In California under irrigation it has made yields of 9.8 tons of field-cured hay an acre, when alfalfa produced but 8.3 tons under like conditions. It ordinarily yields about the same as alfalfa under irrigation in the Southwest, but Sudan grass gives its full crop in three cuttings against the four or five required for alfalfa. It is the only grass yet found which in this part of the United States ranks as the equal of alfalfa in point of yield and quality of the hay. Its record in this respect has led to its use in "patching" old alfalfa



fields when the stand of alfalfa has been destroyed. In the Southern Great Plains, where there is a low rainfall, Sudan grass grown without irrigation will yield from 1 to 3 tons of hay to the acre.

There are certain parts of the United States where it is unwise to depend on Sudan grass for hay. This is true of the strip of territory 200 miles wide along the northern boundary; the regions of high altitudes in the Western States; and also most of Florida and a narrow strip of land along the Gulf coast. Low temperatures prevent success with the grass in the first two regions named, and disease is the limiting factor along the Gulf coast.

Although Sudan grass is best adapted by nature to use as a hay crop, it is also used with great success as a soiling and pasture crop for summer pastures. Its use as a silage material is limited by the fact that it is easily made into hay and fed as such with very little waste, and also because corn and sorghum both outyield it and are generally available throughout the region where Sudan grass is grown.

In the semiarid districts the highest yields are obtained when the grass is sown in rows so as to allow

of cultivation. The advantage in yield of the row over the drilled seedings is so small, however, that most farmers prefer to avoid the necessity of cultivation by drilling or broadcasting the seed. A common grain drill handles well-cleaned Sudan grass seed without trouble and the hay from drilled seedings is finer stemmed and matures more evenly than row plantings.

The feeding value of Sudan grass is equal to timothy hay. In localities where soy beans or cowpeas do well these legumes may be grown in mixtures with the Sudan grass. Such a mixture produces a hay of higher feeding value than the grass alone, because of the high protein content of the legumes.

Sudan grass hybridizes freely with the sorghums. It is necessary, therefore, if pure seed is produced, to have the Sudan grass field at some distance from any sorghums, otherwise it will result in a mongrel crop the following year.

Farmers' Bulletin 1126, of the Department of Agriculture, goes very thoroughly into the details of cropping, planting, harvesting—both for hay and for seed—as well as the best methods of feeding the hay to live stock.

## COOPERATIVE MARKETING.

By O. B. Jesness, Bureau of Markets, U. S. Department of Agriculture.

There are at least 15,000 farmers' purchasing and marketing organizations in existence in the United States at the present time, and the presence of this large number of such enterprises is a clear indication that farmers in many sections of the country have come to appreciate the value of cooperative effort in solving problems of marketing. Recent years, especially, have brought a rapid development of cooperative marketing among farmers. In the irrigated sections of the West, as well as in other regions, there is excellent opportunity for this form of effort.

The grain farmers of the Middle West and of the Pacific Northwest have found farmers' elevators to be very helpful. It is only about 30 years ago since the first farmers' elevator which was able to meet with continued success was established. The growth was slow at first, but recent years have witnessed a rapid expansion, so that there now are in the neighborhood of 4,000 farmers' elevator companies in operation. Dairy farmers have perhaps 3,000 or more cooperative creameries and cheese factories through which their dairy products are marketed. Farmers supplying cities with milk in many instances are organized for collective selling. A cooperative livestock shipping association was formed at Litchfield, Minn., in 1908, and since that time several thousand such associations have come into being. Fruit and vegetable growers in many sections have cooperative

marketing organizations. Tobacco, cotton, wool, nuts, eggs, honey, and other farm products are also marketed cooperatively in a number of sections. In addition, large quantities of supplies needed on the farm are purchased cooperatively.

### FRUIT AND POTATO GROWERS' EXCHANGES.

The California Fruit Growers' Exchange is probably the best-known growers' cooperative marketing organization in the United States. The annual report of the general manager for the year ending August 31, 1919, indicates that this exchange shipped over 33,000 carloads of citrus fruits during that year. This organization has united with it more than 10,000 growers. These growers are members of local associations, which are united in district exchanges, and these make up the central exchange.

The Michigan Potato Growers' Exchange was organized by potato growers of that State in the summer of 1918. During the first year of its operations this organization handled over 2,000 carloads of potatoes and its volume of business the second year increased considerably. Over 19,000 farmers are now affiliated with this marketing organization. Similar organizations are at present being formed in Minnesota and North Dakota.

The Eastern Shore of Virginia Produce Exchange is a growers' marketing organization which handles

thousands of carloads of Irish and sweet potatoes and other products. The annual volume of business of this organization is in the neighborhood of \$10,000,000.

Apples are being marketed cooperatively in many sections and the Pacific northwest is the home of a number of such organizations, including such enterprises as the Apple Growers' Association of Hood River, the Yakima County Horticultural Union, the Yakima Valley Fruit Growers' Association, and others. These are but a few instances tending to show that the cooperative principle can be applied to a variety of conditions and products, including those that obtain in irrigated regions.

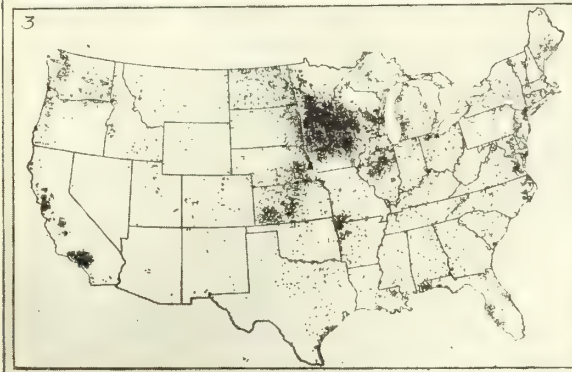
#### PLANNING FOR COOPERATIVE MARKETING.

Communities which have not taken up cooperative marketing find encouragement in the success which has been achieved along this line by many other communities. However, the important part played by local conditions must not be overlooked as cooperative marketing is in no way a universal remedy for all

difficulties. It is when conditions are such that cooperation is the proper remedy that results can be accomplished thereby.

A community which has in mind cooperative marketing should first of all study the local situation. A survey may be made by some of the leaders in the movement in order that accurate information may be available. Among other things, this survey can ascertain the attitude of the farmers toward cooperative marketing and the need which they feel for united effort of this kind, the amount of business available for an organization, the services rendered by existing agencies, and the outlets open to a marketing organization.

A cooperative association for which there is a real need is more likely to succeed than if the farmers do not feel such a keen interest. If existing marketing agencies are insufficient or render unsatisfactory service there is likely to be a greater need felt for an organization than if the growers are satisfied with present methods. The amount of business available should be sufficient to enable an organization to operate economically before one is established.



1. Farmers' cooperative creamery and cheese factory. 2. A busy day—farmers' grain elevator. 3. Location of all cooperative organizations reporting to the Office of Markets and Rural Organization. 4. Packing house—cooperative citrus fruit marketing organization.



Preliminary meetings may be called for the purpose of giving the farmers an opportunity to discuss the question of organizing and to express their views with regard to it. At meetings of this kind committees may be designated to take care of special lines of work, such as arousing interest, drafting by-laws, obtaining members, and the like.

#### FORMING THE ORGANIZATION.

If conditions appear favorable, definite steps should be taken to perfect the organization. By-laws should be carefully prepared and adopted after the growers have had ample opportunity to discuss them and become acquainted with their contents. The Bureau of Markets, United States Department of Agriculture, Washington, D. C., is prepared to furnish suggested by-laws and to assist in organizing cooperative marketing associations. The by-laws are very important and should be sufficiently complete to furnish a working plan for the organization.

Incorporation under State law should be effected because of the legal status obtained for the organization thereby. Incorporation limits the individual liability of the members and permits the organization to sue and be sued in its own name. Many of the States now have special cooperative laws providing for the incorporation of strictly cooperative enterprises. Where there is no such State law it may be necessary to adopt the ordinary business corporation form of organization in order to incorporate.

Cooperative principles should be followed in organizing wherever possible to do so. Each member should have only one vote regardless of his financial investment, the returns in capital invested should be limited to a fair rate of interest, and any further surplus to be distributed should be divided in accordance with patronage; that is, business done through the organization.

The principal differences between the ordinary business corporation and a cooperative marketing organization are that in the former each share of capital stock has one vote, the business is operated to make profits, which are distributed as returns on the capital, and there usually is no limit on the financial interest of a member; while in a cooperative organization the purpose is to effect savings, each member has equal voting power, the returns in capital invested are limited, and frequently there is a limit placed on the financial interest any one member may have in it.

#### TWO FORMS OF ORGANIZATION.

Cooperative marketing organizations may be formed with capital stock or they may be on the nonstock plan. Various factors enter into a consideration of this question. State laws are far from uniform and the provisions of such laws must be kept in mind by organizations desiring to become incorporated. The capital stock form usually facilitates the obtaining of capital, as this is done through the sale of shares of stock. A nonstock organization has membership fees

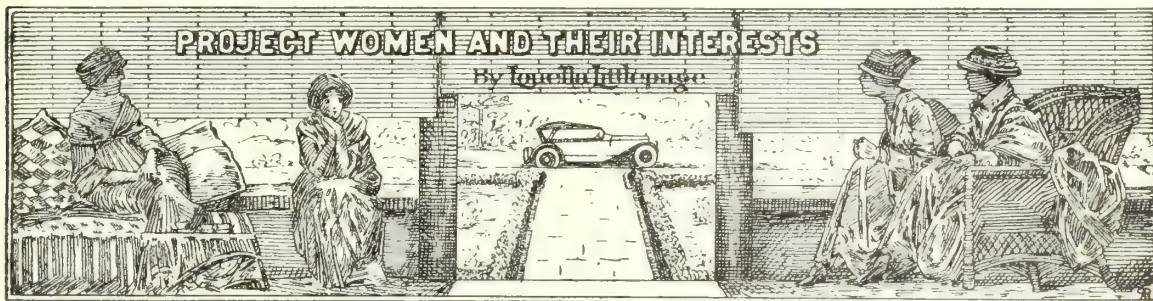
and issues membership certificates to its members in place of certificates of stock. Membership certificates are usually not transferable, consequently it is generally easier to control the make-up of the membership of a nonstock organization than of one formed with capital stock. Also, this form of organization, not having any capital stock on which to pay dividends, may be less likely to deviate from cooperative principles in its operations.

#### OPERATING THE ORGANIZATION.

Success in cooperative marketing is dependent upon a number of factors, including sufficient business, a loyal membership, capable management, up-to-date business methods, and adequate financing. Without a sufficiently large volume of business, the overhead expense is going to be too heavy to make economical operation possible. Unless members have unswerving loyalty to their organization, there is danger that it may not continue to receive sufficient support to enable it to succeed. More and more cooperative marketing organizations are realizing the importance and value of having contracts with their members, binding them to sell their products through the organization. Such contracts insure the organization a definite volume of business, enable the management to plan properly for the marketing activities, and give the organization an opportunity to demonstrate its possibilities.

Cooperative marketing organizations are business undertakings and can not hope to succeed unless they have the benefit of good management. The manager who is placed in charge of the activities of the organization should be experienced in marketing and should have the confidence of the individual growers. Selection of the manager should be made on the basis of qualifications, and questions of friendship or relationship must not enter into the consideration. With regard to salary, it is well to remember that the man who is willing to accept the lowest salary may prove to be the most expensive man in the long run because mistakes in judgment may amount to a great deal more than the difference in the salary between a poor and an efficient manager.

Most types of cooperative marketing organizations find it advisable to pool the products according to kind and quality, and await returns from sales instead of attempting to buy the farmers products and resell them. The latter plan involves the organization in speculative risks due to fluctuating market conditions and other factors. The plan of pooling the growers' products for definite periods, gives each grower having products in a pool, the average price received for products of like kind and grade in that pool, so that he is protected against temporary fluctuations in the market. The association can make advances to the growers from time to time as the products are sold and final settlement for each pool can be made at the end of each pooling period.



As the manuscript for the August RECORD was handed to the editor we closed our desk and prepared to put into practice the last bit of advice urged upon the project women—to take a vacation. For a year the prospect of a motor trip through New England had been before us, but it is a foolish pastime to enthuse overmuch on a planet where only two things are sure to come to pass—especially taxes. And so it was not until the District line was behind us that we dared to be childishly thrilled at the approach of dawn, and at glimpses of the road beckoning us over a hill and then fading mysteriously in the mist and shadows at its base, for we were on our way shortly after 4 o'clock a. m.

If ever you go a jaunting by automobile, other forms of locomotion never will appeal to you again. It would have been delightful could every project woman have accompanied us on this trip, and it would please us beyond measure to ramble on and on concerning it in the columns of the RECORD, but there is a practical editor to reckon with, and he is properly conscientious about using "space" to the best advantage. However, a brief outline of the trip can not be amiss.

There were four women in the party, the wife of a local optician and magazine editor, who acted as chauffeur and was the owner of "Elijah," our seven-passenger Chandler; her mother, 74 years old and the best sport in the crowd; the wife of a New York and Washington attorney; and myself. The American Automobile Association furnished us with "fool-proof" maps and routed us first to Sea Girt on the Jersey coast; thence over a road hugging the shore and passing through a succession of seaside resorts in various stages of popularity, across the ferry to Staten Island and again from that island to New York City. Up State, past Tarrytown, the road turned to the east into Connecticut, where it soon veered toward the Massachusetts line, for the Berkshire Hills were our first objective.

You dwellers of the West, to whom the lofty Rockies are a familiar sight, may smile if you like, but the most blasé traveler who once takes the Mohawk Trail through these beautiful hills will long to return to them again. The road trails along the slope of shelving hills like a wild vine; it slides

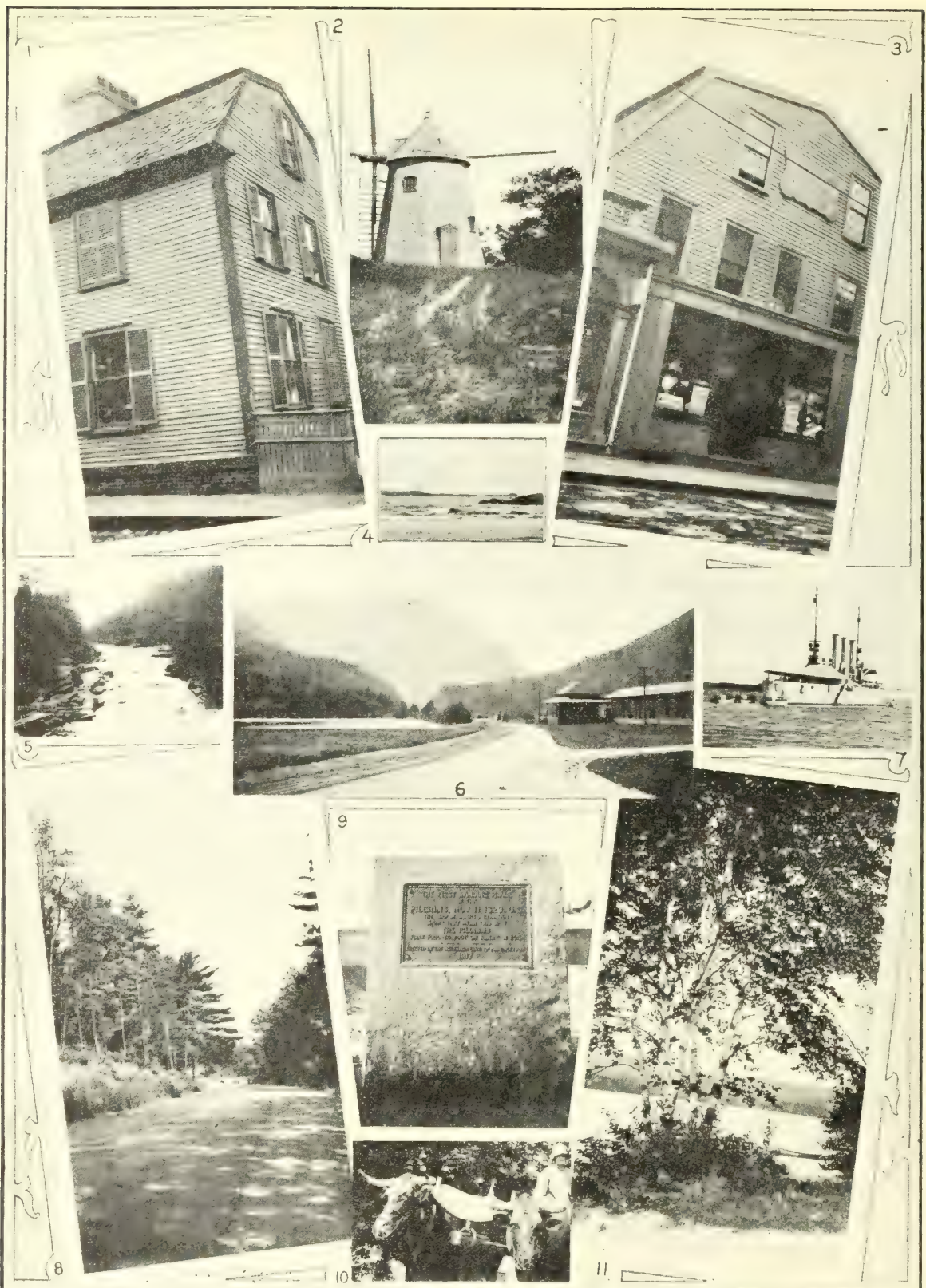
through ravines as the thread slides through the eye of a needle; it follows water courses, sails over hills, skirts terrifying gorges, and turns sharp corners in a style calculated to remind one of the youthful game of "snap the whip."

We wanted to loaf for awhile, but the lakes and mountains of New Hampshire were calling. There never were more beautiful lakes. It was a happy thought which prompted the New England pioneers to keep their Indian names. There were Sunapee, and Moose, Squam, and Winnesquam, several names which have slipped our memory, and, of course, Winnepesaukee—what a softly rhythmic sound that word has. The music of the wind is in it, and it fits the beautiful sheet of blue as no other word could. The shores of these lakes are fringed with dainty birches and beautiful, fragrant pine trees, and across narrow straits alluring islets tempt you to linger.

We would not tire you with a description of the White Mountains, with their famous "Notches" and rock carvings, but there were impressions which we must pass on to our friends. For the most part the road tunneled through trees whose foliage almost met overhead, and occasionally from some elevation there would be a charming vista of distant mountains, forests, and lakes. There were gorges through which, in the brave days of old, the Indians were wont noiselessly to defile when on the warpath; there were brilliant and noisy cataracts and cascades that silvered the rocks with spray; there were springs bubbling by the wayside; and now and again you would come suddenly upon a village, half hidden like a bird's nest among the leaves. Everywhere there was that impalpable, invisible balm from the pine forests permeating everything and wafted down dale and across fields to us, the silent offering of the north woods and a fine tonic for fagged city lungs.

From the White Mountains we went to Portland, Me., and from that point followed the coast clear around to Provincetown on the tip end of Cape Cod. In Boston we stopped only for mail, and at Plymouth to stand for a time reverently beside the historic rock, but a couple of nights were spent at little coast towns, and it was amusing to note how these little places crowd down to the shore. The hotels actually stalk out over the water on stilts, as if to guard every





1. Hawthorne's birthplace. 2. Cape Cod windmill. 3. The witch house. 4. The rock-bound coast of Maine. 5. A mountain stream in Franconia Notch, White Mountains. 6. Crawford Notch, White Mountains. 7. Warship in Narragansett Bay. 8. The Mohawk Trail through the Berkshire Hills. 9. First landing place of the Pilgrims on Cape Cod. 10. A New England conveyance. 11. Lake Winnepesaukee.



inch of the shore, steeped in tradition and history, from plebian alien eyes.

Perhaps the most delightful day of the whole trip was spent in Salem. "Son," we called to a little freckled youngster on the outskirts of the city, "can you tell us how to get to The House of the Seven Gables?" We were informed that for 50 cents he could show us the whole city; so we took him in, and later our suspicions were confirmed that "Son" made a habit of lingering in the outskirts to enlighten ignorant tourists. But he was worth much more than he asked, and we suspect that some day this same youngster may grace a Chautauqua circuit. We saw the old Witch House where the poor unfortunates were tried, condemned in advance; the Roger Williams Meeting House, now hidden in a back yard and accessible only through other property; Chestnut Avenue, where every house proclaims its aristocracy and antiquity by its beautiful colonial doorway with burnished knocker; and last, but most interesting of all, The House of the Seven Gables. The house was purchased some time ago by a philanthropic and patriotic person to save it from the ravages of time or commercialism and has been turned over to a group of settlement workers, who live in a portion of it and keep it as nearly as possible as it was in the days when Hawthorne immortalized it with his pen. There is old Hepzibah's little shop, where wares are now sold for the benefit of the settlement work; little Phoebe's room, its window still looking down into the garden. We saw the secret stairway where witches hid, the meal box which was bewitched and danced until the good parson prayed it back to respectability, and other quaint and fascinating objects too numerous to mention.

Cape Cod, with its Dutch windmills and colonial houses knee deep in picturesque sand dunes, is charming, and what an odd little place Provincetown is. It is huddled on the inner shore line as if it had slid down from the sand dunes on the outer shore and lodged at the very edge of the Bay. It consists of a long, narrow street, its shops and houses centuries old, and bristling with bronze tablets, which bear convincing testimony to its claims to everything "first" in America.

The return to New York took us across Narragansett Bay, through Newport, Narragansett Pier, thence along Long Island Sound, through New London, New Haven, Stamford, Bridgeport, and other interesting old places.

The memory of the charming New England villages with their century-old trees and snowy colonial homes will make much of the modern architecture look rather trashy for some time to come.

There is one other feature of the traveled trails in that section which must be mentioned, and that is the numerous tea rooms, with their euphonious, alluring signs. There are the Trail-Top Inn, Pine Tree Tavern, Hollyhock Tea House, the Bend-of-the-

Road House, the Have a Cup o' Tea Cottage, etc. We ventured to visit one of these doll houses one day. It was kept by two little puritanical maiden ladies, with white hair, prim plain gowns, and a "six-of-a-kind" set of mulberry china. They must have been direct descendants of Capt. Kidd himself. A ham sandwich was valued at 65 cents, and it wouldn't make a good bite for a kitten at that, let alone a hungry tourist. Even the mulberry china was for sale, but we hadn't the courage to ask the price.

We knew we wouldn't know where to stop, and now the editor is calling "copy," so this must be the end o' it, but after taking our own medicine and finding it good, we had to boast a little. Won't you tell the RECORD what you did on your vacation?

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One of the most important problems of the day is voiced in a slangy war-time jazz, which impudently inquires "How you going to keep 'em down on the farm." "Why," say social economists, "the only way is to make farm life more attractive than any other." The fact is so self-evident that it constitutes an inane reply without some constructive suggestions as to methods of arousing the child's interest in each farm season with its varied routine.

Consider, for instance, your child this month. Will the ringing of school bells be music to his ears or a jangling overture to disagreeable duties? How do you view the coming school year? Are you satisfied with your school buildings and their equipment; do you feel that there are sufficient teachers and are they the best to be had? If not what are you doing individually to improve conditions? Next to a healthy body a mother's next duty to her child is to see that he has a healthy and well-stored mind.

The Bureau of Education states that there are still 210,000 one-room rural schools in the United States. It is claimed by those who have made a careful study of this question that probably two-thirds of these schools—that is, 140,000—can be consolidated by a 10-year Nation-wide campaign if a sufficient amount of financial aid can be provided therefor. This would leave 70,000 schools beyond the realm of practicable consolidation.

If this is true, then the least we can do is to make these 70,000 one-teacher schools the best that money and qualified teachers can make them. The best qualified teachers must be placed in these schools for the reason that here is where the Herculean task is. It is not the place for amateur adventurers or juvenile pretenders. Wherever the Nation and the State permit a man to go with his family in an honest effort to earn an honest living, it is the duty of the Nation and State to follow that family and to provide the children thereof with adequate school facilities, and if you are a mother in such a school district it is your sacred duty to see that this is done.



Where one teacher has to teach children of all ages and sizes, it is absolutely impossible for any child to get the attention he deserves. We all know what happens when a farmer tries to cultivate three times the acreage for which he has adequate horse and man power. Every plant on the farm becomes a sickly dwarf of what it ought to be. Is your child's mind being dwarfed and impoverished by insufficient or improper cultivation?

Are there long school terms and compulsory attendance laws in your State? No. Then, do something about it yourself. There is a disgraceful inequality between the rural schools of many sections and city schools, and there are still some parents who talk about their right to the labor of their children. For such, compulsory attendance laws are necessary.

But all this is beside the immediate question of arousing the child's interest. Is the inside of your schoolhouse beautiful and homelike? It is the child's home for the greater part of the year and should appeal to his senses and increase his love of the beautiful. Reproductions of the world's famous paintings should be hung on the walls. The cost of these is small and through them the child will unconsciously absorb an appreciation of the beautiful which will constitute one of the important features of his education.

Are the school grounds attractive and the building itself beautiful and artistic? Take a look at your school before the session begins and see if the building is well painted and if the grounds can be improved this fall. There is much that can be done now even in the northern sections to make the grounds beautiful with vines and flowers, shrubs, and trees.

Has your school a library where the reading habit may be cultivated in connection with your child's lessons and where he can learn how to continue his education through life; where he will be directed to the proper literature? A school library should be a community library in rural sections, and the children should be allowed to bring magazines from home to exchange with companions so that children and parents may have a better acquaintance with the world of current literature.

Does your school do any farm work in connection with its other studies? In one southern school district there were no funds available for farm work, so three farmers set aside an acre each for the use of the school. Tobacco, corn, and cotton were grown on two of these "experiment farms" and the third acre was put into garden truck. The first year some of the farmers themselves conducted the classes, but the next year a county agent was secured as adviser. In another section the school patrons cultivated a few acres on the cooperative plan and the sale of the crops provided a fund of \$300 toward putting agriculture in their curriculum.

Every school should be an example of health seeking to the community. The most modern principles of

sanitation and hygiene should and may be practiced in the smallest of districts.

But one of the most important features should be a large and well-equipped playground. Many farmers have not yet come to value as they should the part which play rightly has in a well-rounded existence. To most of them play may be tolerated but not encouraged. This is all wrong. Neither children nor adults should give to play the time that should be given to performing their work well, but we shall be happier when we learn to work with our utmost strength and energy and then take a reasonable time for play and recreation. The children should not only be encouraged to play at school, but the grounds should be carefully laid off for baseball, tennis, basket ball, etc., and the parents should meet with them Saturday afternoons when farm work will permit it to enjoy the wholesome companionship which such occasions promote.

In the winter there should be lectures, debates, and musical events, and the school board and teacher can easily secure the services of worth-while speakers from near-by towns and the State college, as well as musicians from neighboring localities.

And whatever you do, teach the children to sing. You may think you don't feel like singing, but take the children and meet your neighbors in the school auditorium and let everyone sing the good old songs and a few new ones for variety. Show an interest in your children's work and play, and "playing hookey" will become an obsolete expression.

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While this is the season to devote an unusual amount of time and thought to school matters, every month in the year will present its own peculiar opportunity for helping to "keep 'em down on the farm."

Did it ever occur to you mothers to look more closely into the secret places in your child's nature that you may know his heart's desires and so make him happier and at the same time help to mold and direct his tendencies?

Play a game with the kiddies. Get them to express their utmost longings. Bring your own desires out into the sunlight. Is it shorter hours of labor you long for; a more convenient house with better equipment, or is it an occasional change to break the monotony? Is it for a pretty room your little girl sighs, artistic furniture, music, companionship, pocket money, or pretty clothes? Does your young son want a wireless apparatus, some games, or books?

Let the RECLAMATION RECORD in on your game and write for suggestions or make suggestions as how to obtain what is craved to complete someone's happiness. There is really very little in this life that can't be had if one's energies are properly directed. Let's run an idea exchange. If a girl on the Yakima project, for instance, wants to earn some pin money, another girl on the Carlsbad project, perhaps, can tell

how she managed the same proposition, or if some woman on the Belle Fourche project can't make her currants "jell" a ranch woman on the Newlands or some other project surely will be proud to tell her why.

But don't forget that it's up to you to get in the game personally if it is to be a success. Aren't you a little prone to let someone else do it? In this connection please don't fail to send in your favorite recipe to-day. A number of women have expressed their approval of the RECLAMATION RECORD cook book but failed to send a recipe, and some recipes have been received with no name attached.

### Reclamation Record Cook Book.

#### AUNT MARGARET CLAWSON'S CREAMED CHICKEN.

(By H. T. Cory, former consulting engineer in charge of soldier-settlement work, southern division.)

- 1 chicken.
- 1½ pints cream.
- Little thickening.

Cut chicken in (small for serving size) pieces, salt, and put in hot frying pan until outside is golden brown.

Then pour boiling water over it and let simmer until just ready to fall from the bones. Let water boil down so that juice boils back into chicken and browns a golden brown. If chicken is not fat, put in butter to brown. Take chicken out and add cream and little by little sift in white flour until gravy is rather thick. Put chicken and gravy in big hot dish and serve.

Fine with jelly on side and corn fritters and mashed potatoes.

Aunt Margaret Clawson was the second of four wives of Bishop Clawson, private secretary to Brigham Young and ambassador of the Mormon Church in its contention with the Government. Aunt Margaret was considered the cook par excellent of the Mormon Church.

#### DRESSING FOR CHICKEN.

(By Miss Harriet A. Fellows, special fiscal agent, Washington office.)

- |                         |                           |
|-------------------------|---------------------------|
| 2½ cups shredded bread. | Salt.                     |
| ¾ cup of mashed potato. | Sweet herbs mixed or sage |
| ½ small onion fried.    | and thyme.                |
| 1 egg.                  | 1 pinch baking powder.    |
| 1 tablespoonful butter. | 2 tablespoonfuls milk to  |
| Pepper.                 | moisten slightly.         |

#### BROWN BETTY.

(By Mrs. G. B. Mathiot, counsel, Land and Contracts Division.)

Put layer of apples peeled, cored, and cut fine into baking dish, then a layer of bread crumbs, sprinkle with brown sugar and cinnamon. Repeat until baking dish is tightly packed. Dot top with butter, bake, and serve with hard sauce.

#### BOSTON BROWN BREAD.

(By Justin H. Brown, Transportation Section.)

- |                     |                     |
|---------------------|---------------------|
| 1 cup corn meal.    | ¾ cup of molasses.  |
| 1 cup rye flour.    | 1 teaspoonful soda. |
| 1 cup graham flour. | 2½ cups of water.   |

Grease well a tin with a tight cover (a baking powder or coffee can will be fine). Steam three hours.

#### CORN BREAD.

(By E. G. Paul, Purchasing Division.)

- |                    |                            |
|--------------------|----------------------------|
| 1 cup wheat flour. | 2 tablespoons sugar.       |
| ½ cup corn meal.   | 3 teaspoons baking powder. |
| 1 teaspoon salt.   |                            |

Sift all three times together and then rub in 2 table-spoons of butter.

Break an egg in bowl, beat and pour in cup of milk. Mix and pour on dry ingredients. Stir and pour in well greased pan. Bake in slow oven about half an hour.

#### EMERGENCY MUFFINS.

(By J. B. Beadle, Director's Assistant.)

Mix and sift 1½ cupfuls pastry flour (once sifted), 3½ teaspoonfuls baking powder, and ¾ teaspoonful salt.

Work in ¾ tablespoonfuls lard, using tips of fingers. Add gradually ¾ cupful each milk and water, mixed quickly. Drop by tablespoonfuls into buttered hot gem pans and bake in hot oven about 15 minutes. Serve piping hot.

#### OATMEAL MUFFINS.

(By Miss Mae V. Sweetnam, clerk.)

- |                               |                       |
|-------------------------------|-----------------------|
| 1 cup oatmeal.                | ¾ cup sugar or sirup. |
| 1½ cups flour.                | 1 egg.                |
| 3 teaspoonfuls baking powder. | 1 cup milk.           |
| ½ cup shortening.             | Pinch salt.           |

—L. L.

### RECLAMATION ABROAD.

#### Northeastern Brazil.

The President of the Republic was successful in securing legislative sanction of a comprehensive project for the reclamation of the arid lands of northeastern Brazil. Elaborate plans have been drawn up and a very able engineer, familiar with American methods, has been placed in charge and a large appropriation set aside to cover the expenditures for this project, which will reclaim thousands of acres of the most fertile land in the world and relieve the sufferings of the famine-stricken people of this section.—*Commercial Attaché J. E. Philippi, in Commerce Reports.*



## THE RELATION OF IRRIGATION PROJECTS TO DRY LAND FARMING.

By R. M. Conner, Project Manager, Fort Peck (Indian) Project, Montana.

In the discussion of this subject the writer has in mind the State of Montana and the western part of North Dakota.

For a good many years past there has been a good deal of discussion as to the advisability and necessity for the construction of irrigation works in Montana. Its rainfall seems just enough to encourage dry farming and too much to make irrigation necessary.

This difference of opinion is not new. During the early seventies there were two classes of men in the territory. One claimed the country was good for nothing but range land and a hunting ground for the Indians. The other advocated the great agricultural possibilities of the State. The latter were termed "paid agents," as they were supposed to be boosting the country on account of the activity at that time to encourage the construction of the Northern Pacific Railway.

Old Sitting Bull was strongly of the opinion that the country was for hunting and fishing, and his opinion was shared by Gen. Sheridan and Capt. Hayden, then stationed at Fort Buford. Gen. Custer was in disfavor in 1876 on account of his stand that the country had a great future along agricultural lines.

It is a matter of record that the first thing done by the early settlers was to appropriate water for irrigation. One of the founders of the present city of Miles City says water was appropriated from Tongue River at the establishment of that city.

This system prevailed until about 1900, when the dry-farming movement began to grow, and as the interest grew there came a time not long ago when the advocates of irrigation were believed to be knockers, and the construction of irrigation works was believed unnecessary. This condition reached its apex in 1916, but since that time a series of three dry years has created a demand for irrigation in some localities.

There are still those who maintain that the plowing up of the vast area of Montana's land will increase the rainfall and that good crops can be raised even in dry years without irrigation. Every snowfall or rain is heralded as a guarantee of a bumper crop, regardless of the extent or time of occurrence. Some are still so optimistic as to decry the need of summer fallow, and point to the dry conditions that once occurred in Kansas as an argument that Montana will some time be as wet as Kansas has been the past few years.

There was a time when the dinosaurs roamed the plains of Montana and slept under the shadowing palms that then grew along the shores of the tropical Missouri River, and who can tell but in the far distant future the musk ox will roam unmolested over the frozen area of northern Montana?

A careful study of the rainfall of Montana for the past thirty-odd years does not lead one to believe that any great change can be expected within the near future. The earliest rainfall records are those at Bozeman, which began in 1880, and several other places have records beginning in 1886. From these records it appears that there have been periods equally as dry as in the past three years, and there have been years in which the rainfall has been much greater than that of the favored period prior to 1917. In all these years there seems to be no marked regularity as to when the rainfall will occur. Some pretend to forecast these good years, but without much success.

There are some portions of Montana where the rainfall is more favorable than over the eastern half, and in certain areas dry-farming methods have met with success during most years, but the season just passed (1919) has been a trying one over the greater part of the State. Not only has there been a failure of the cultivated crops, but it has been necessary to ship a large proportion of the stock for winter feed. A large number of the cattle kept in the State are being fed on hay and grain shipped into the State or from irrigated tracts.

In 1912 good blue-joint hay was obtainable in eastern Montana at \$4 a ton; to-day the cattlemen and farmers are paying \$32 for North Dakota slough grass and \$40 for Yellowstone alfalfa. In 1912 there were millions of acres of unentered and ungrazed land; to-day the area of unentered land is very limited, and the grazing land is difficult to obtain.

The three dry years just passed have had a good deal to do with this change, but the great change has come about through the increase in population and the corresponding reduction in the available range.

Montana, like all new States, has been cursed by the influx of "get-rick-quick" farmers, or, as they are sometimes known, "shotgun farmers." These must give way to the real farmer who is looking for a home and with his cattle and chickens and industrious wife will make a living on the vast area of Montana's soil.

Montana has an area of 93,568,640 acres,\* of which it is estimated 30,000,000 are farm land. It has been estimated that there are 3,000,000 acres of irrigated land in this State. I do not believe there are much over 1,000,000 acres actually irrigated or that the ultimate area will be much over 3,000,000 acres.

The irrigation project should act as a sort of an insurance policy to the vast area of semiarid dry land. The development of an irrigated area, where alfalfa and other forage crops are raised, will provide a dependable supply of feed for a vast number of cattle and insure the investment in dairy cattle. The de-







velopment of the irrigated area will increase the value of the dry land surrounding it. There are millions of acres of land in the State which are only suitable for grazing purposes, and the abundance of alfalfa available through irrigation will provide winter feed for the cattle grazed on these lands.

It has been only a few years since the men engaged in irrigation enterprises were looked upon with suspicion, and their work was considered a needless expenditure of money. Men under the proposed units prayed to have their land released from the irrigation units. Since the dry period began, the demand for irrigation has increased. A few years ago \$40 or \$50 an acre was considered too much to pay for the construction of irrigation works. At present, these same water users are advocating the construction of works at \$100 an acre.

I am not as pessimistic as some over the possibilities of dry farming in Montana. I still believe that the great unirrigated area of the State will be cultivated successfully under this method of agriculture. Too many of the farmers in eastern Montana have carried their beans in one basket during the past three years. The high price of wheat, oats, and flax has caused many to increase their acreage of these crops and neglect the raising of forage crops and the keeping of cows, hogs, and hens. In many cases this increase in acreage has resulted in poor farming. Few have done any summer fallowing, and the dry weather has been favorable to the growth of weeds.

I have in mind a dry-land farmer not far from Poplar, who has made a paying business of farming the past three years. He has a good number of milch cows, 4 head of horses, a good number of hens, and this year raised 26 hogs. His wheat was poor, he cut his oats for hay, his corn made about 40 bushels to the acre on 23 acres, and he sold the hogs at an average of \$55 apiece after feeding corn from two to three months. His eggs, butter, and milk support the family. And he has a Ford car for business and a Buick "6" for pleasure. He now wants to buy 40 acres of irrigated land to raise alfalfa for more winter feed.

For several years prior to the opening of the Fort Peck Indian Reservation, the country to the east was well settled and in a prosperous state of dry farming. It was the habit of these farmers to graze their cattle on the reservation in the summer and to cut hay on the reservation for winter feed. The reservation has been opened six years and the best land is homesteaded and vast areas of Indian allotments have been leased for dry-farming purposes. The summer range has been cut down and the chance to cut hay on the open plains is gone. These farmers see in the development of the irrigation works on the reservation an opportunity to obtain forage for their dairy herds and a possibility for greater returns through having a dependable supply of feed.

## REPAIRS TO PAVEMENT, MINATARE DAM, NORTH PLATTE PROJECT, NEBRASKA- WYOMING.

### 1. Storm Damage and Temporary Repairs.

By W. H. Fisher, Assistant Engineer.

During a severe wind storm, which occurred on the afternoon and night of April 10, 1920, a portion of the concrete slab facing of the Minatare Dam was washed out. The safety of the dam was not seriously threatened, but it was imperative that temporary repairs and protection be provided at once in order to prevent still further damage by possible future wind storms.

The reservoir water level at this time was approximately 3 feet below that of maximum capacity. It is estimated that the waves reached a maximum height between crest and trough of 5 to 7 feet during the storm. The wind was from the north-northeast, and the face of the dam, which lies due east and west, consequently received almost the full effect of the waves. It is very seldom in this vicinity that so violent a wind comes from this quarter. The length of exposed water surface above the dam in this direction was about  $1\frac{1}{2}$  miles.

The slope on the reservoir side of the dam is  $2\frac{1}{2}$ :1 from the base of the dam to the elevation of maximum high water. Above this point the slope is 2:1 to the top of the earth dam for a vertical height of 15 feet. A concrete parapet wall surmounts the top of the concrete slab 1 foot above the top of the dam, thus affording a total freeboard above high-water level of 16 feet. The effective freeboard at the time of the storm was therefore about 19 feet. The concrete facing was made up of rectangular slabs 10 feet by 20 feet and 8 inches thick, with the 20-foot dimension running up and down the slope of the dam. These slabs were not steel reinforced with the exception of a few short bars placed near the horizontal joints of the slabs to strengthen them in transmitting the component of slab weights lying along the slope

(Continued on page 419.)

This condition is typical of the conditions adjoining all irrigated areas throughout the State. The interests of the two classes of agriculture are common. There is room enough for both even in favorable years. Montana's population is relatively very small and it should grow in coming years. Dry land around Grand Forks is selling at \$145; in eastern Montana there are thousands of acres available at \$15. As soon as we have a favorable year the immigration to Montana will be greater than ever, and the requirements for irrigated land will increase to insure a dependable supply of forage and grain.

of dam. The effect of this reinforcing is practically negligible as far as the strength of the slabs is concerned. The horizontal joints between slabs are rounding, as shown in the accompanying drawing; the transverse or sloping joints are straight vertical joints. All joints have one thickness of rubberoid roofing inserted to separate adjacent slabs.

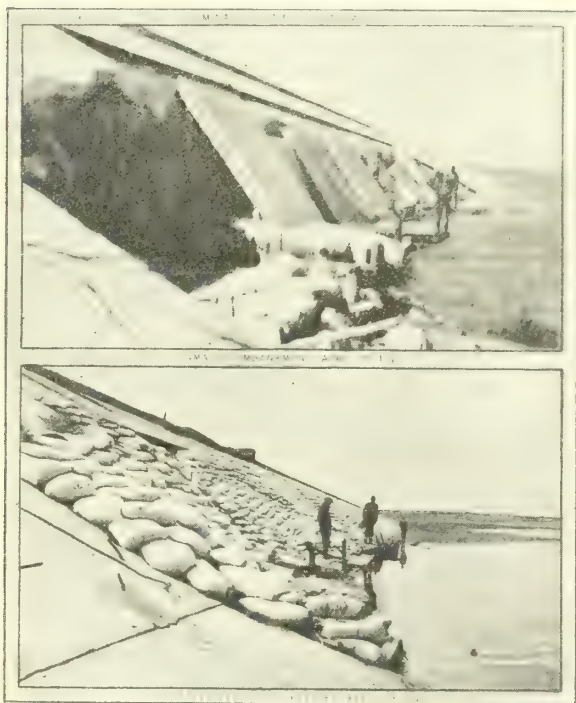
The break in the paving was located between stations 21+80 and 23+30 of the original dam stationing, comprising a net length of 150 feet. The width of the break measured along the dam slope was about 38 feet, extending from a slab joint located 9 feet above the maximum high-water level of the reservoir to a line located roughly about 6 feet below the same

that the exact condition of the paving still intact beneath is hard to ascertain, as it is submerged under water. A total of about 550 cubic yards of the earth filling of the dam was removed during the storm, the major portion of which was dropped onto the submerged paving below the break.

During the fall of 1919, when the reservoir was empty, a series of tests was conducted to determine whether any hollow spaces existed beneath the slabs near the high-water line. Holes about 4 inches in diameter were chiseled through the slabs at what appeared as likely spots for investigation, but no hollow spaces of any consequence were found, the largest space found being not over 2 inches deep and not over 3 or 4 inches wide. The results of these tests indicated that there was at that time no serious cause for apprehension in regard to hollow spaces existing beneath the slabs.

The reservoir was again filled during September and October, 1919, to full capacity or maximum high-water level, and dropped gradually due to seepage and evaporation losses to the level existing on April 10, 1920. During this time several severe windstorms occurred, and it is probable that these intervening storms gradually undermined one or more portions of the lining, as explained later, so that it was not in shape to resist the extra severe storm which caused the damage.

The Minatare Reservoir has been in service some five years, and during that time numerous cracks have developed in the concrete facing, and several of the transverse or sloping joints have opened up to some extent. Most of these cracks or openings are negligible as far as any possible water action getting through them is concerned, but others have reached a critical width of about one-fourth inch, so that with violent wave action it is possible and indeed probable that some of the underlying material which is mostly coarse sand has been washed out, particularly along those cracks running generally up and down the dam facing. There was evidence of this along one of the sloping slab joints, which was exposed by the break, where a small pocket about 3 inches deep was visible directly under this joint at a point at least 5 feet above the water level. Such pockets would probably reach a maximum size at or near the water level, and it is conceivable that when such a pocket had reached a certain size the impact effect of heavy masses of water falling on such a slab might ultimately cause a settlement of one edge of the slab, especially should there happen to be a longitudinal crack in the slab that would readily allow such settlement to take place. Granting that such a settlement could take place it is readily seen how the cracks might then open up to such a degree as to wash out still more material, until actual undermining would take place, and the slab would drop and expose the under-



datum or 3 feet below the water level at the time of the storm. The slabs above the high-water line were not badly broken, but for the most part were simply dropped down or left standing on a steep slope against the nearly vertical earth face left at the back of the washout along the dam, as shown in the illustration.

There is no doubt that the position in which these slabs were left prevented a more extensive earth washout from the dam before the storm subsided. The lower portions of the slabs seem to have been badly cracked or broken by the violence of the storm and were shoved out over the unbroken pavement below, together with the earth filling washed out, so

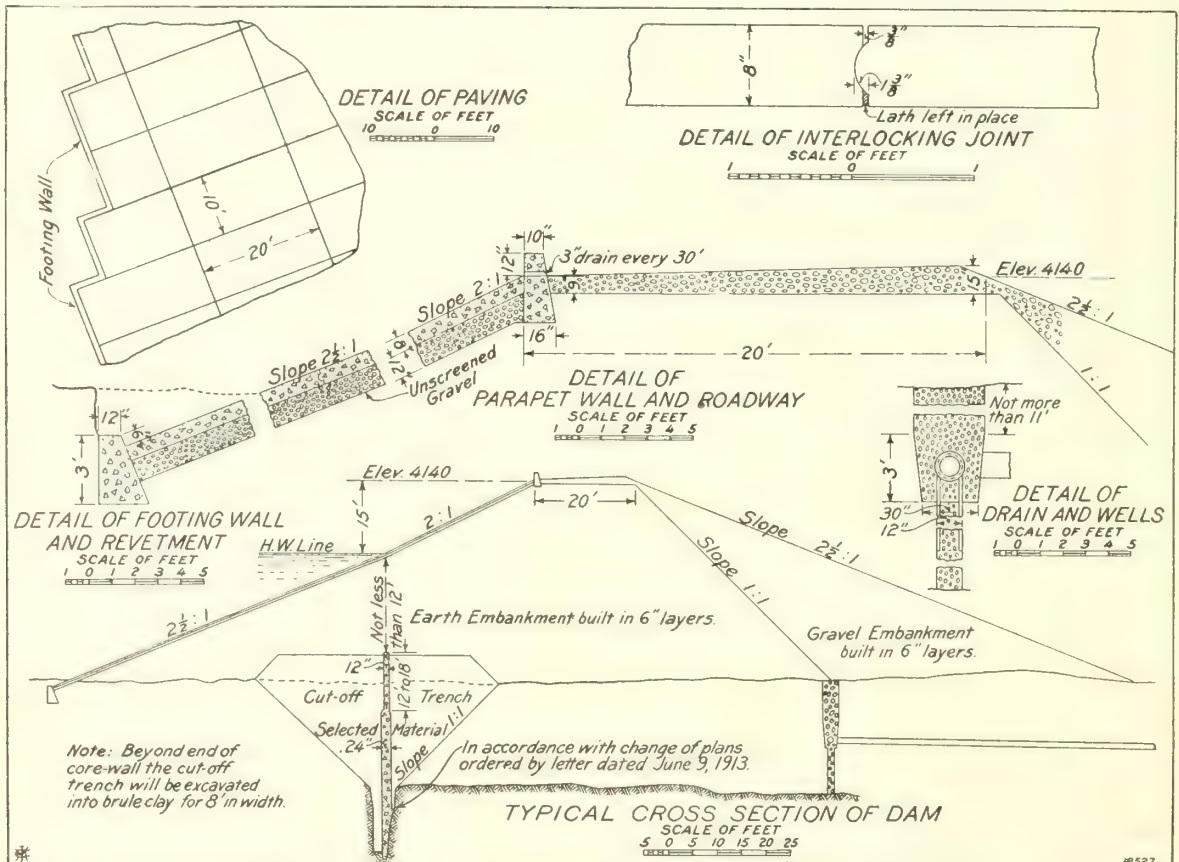


lying material to direct wave action, so that the destruction of a considerable portion of the dam facing would occur in a relatively short time in a heavy storm. It is believed that this is the method by which the recent slab failure proceeded, notwithstanding that there may have been other contributing causes. There is some evidence that there has been a slight outward displacement or bulging of the paving immediately below the break and well below the water surface. This point has as yet not been determined, but if proven might also have an important bearing on the direct cause of failure.

Temporary repairs of the break were started on the morning of April 12 by a force of six laborers breaking up the large pieces of dislodged concrete slabs with gads and sledges. The pieces were left as large as practicable for handling and were then built into a bulkhead or wall along the lower edge of the break which was under 2 to 3 feet of water. This wall had a minimum thickness of about 3 feet, and was built as tight as possible, using only the rough broken pieces of slab. There was enough broken slab available to carry this wall to a height of about 3 feet or about 1 foot above the present water level.

Coarse gravel was in the meantime hauled from a hill west of the dam and dumped on the crest of the dam immediately above the break. A single pulley block was anchored near the water line with a team on one end and a mormon scraper on the other. The team was kept on the dam and two men handled the scraper, pulling the gravel over the parapet wall and down into the cavity, which was thus filled to within 2 feet of the original surface of the paving. A gang was then started filling sacks with gravel and placing them shingle fashion, starting at the bottom. First a layer was made of burlap sacks and then two layers of cement sacks on top. These sacks also extended well over the top of the wall previously described. It is believed that the work thus done offers ample protection against future storms until the water level has been lowered during the coming irrigation season to such a point that permanent repairs can be made. Repair work proceeded until the 17th when work was practically stopped until the 21st due to a severe blizzard and heavy snowfall. The work was finished on April 27.

The total cost of making the necessary temporary repairs was \$2,600 distributed as follows:



CROSS SECTION AND DETAILS OF DAM NO. 3, NORTH PLATTE PROJECT.

Labor, breaking and placing concrete slabs-----	\$100
Labor, hauling and placing gravel fill-----	860
Labor, filling and placing sacks of gravel-----	940
Material, cost of sacks used-----	700
Total cost-----	<u>2,600</u>
Number of loads of gravel used-----	470
Length of haul-----mile--	1
Unit cost per load-----	\$1.83
Total man-days labor-----	261
Total team-days labor-----	146

## 2. Proposed Reconstruction.

By Andrew Weiss, Project Manager.

In August, 1916, a similar failure of a portion of the paving of Minatare Dam occurred, though of a much less serious nature. The cause of the 1916 failure was thought to be primarily the settlement of the dam foundation, which was noticed during the time of the building of the dam, and caused a series of horizontal cracks in the paving. In some places these cracks became sufficiently enlarged to permit the wave wash to suck some of the fine material from under the blocks, thereby partly undermining them, and as this process advanced the facing blocks finally lost sufficient support, which condition resulted in the opening of extended horizontal cracks, and with the opening of these conditions rapidly became reciprocally worse, until failure occurred.

Following the 1916 failure numerous tests were made over the entire facing, especially near the places where these horizontal cracks had developed, to determine the extent and location of hollows which had formed or were in process of forming. A grouting machine was then installed, together with an air compressor, and these defective places in the facing were tapped with holes and grout forced into place to refusal. The broken portion of the pavement reported in August, 1916, which extended from station 28+90 to 30+80, was replaced after the close of that irrigation season, and no further deterioration or damage was noted on the facing until the break of April 10, 1920, occurred, which is described in Mr. Fisher's article.

The repair of the present break is thought to be a simple matter of replacing the broken paving with slabs of the original thickness, 10 feet in width and either of continuous length or with hinge joints horizontally placed, as originally built. This paving should be reinforced with quarter-inch square bars, spaced 6 inches, center to center, in the middle of the slab, reinforcement being placed both ways, horizontally as well as along the slope. Under the joints it is suggested that concrete sills be placed 6 inches in thickness by 12 inches in width, to prevent the further removal of fine material by sluicing from underneath. This means of prevention was adopted in the

case of the Pruitt Reservoir, illustrated on page 103, volume 77, Transactions American Society Civil Engineers, 1917.

An effort will also be made to locate any further hollow places which may have formed under the paving elsewhere, particularly where any other cracks are noted through which the sand may have been drawn by the wave action.

The behavior of the Minatare Dam facing would suggest rather strongly that wherever it is desirable for any reason to omit the screened gravel layer between the concrete facing and the body of the dam the facing should be reinforced and placed in continuous layers from bottom to top or in slabs of not less than 20 feet length with hinge joints, and that the joints between these courses be underlaid with concrete stringers or ribs, also reinforced, which would prevent the sucking of sand from under these slabs. It is very seldom that unscreened gravel can be obtained containing a sufficient proportion of coarse material such as would effectively resist the wave wash, so that a crack of any size, even a temperature crack, becomes a source of danger unless the underlying material is in some manner protected from resulting suction. Furthermore, cracks are liable to develop, due to the settling of the foundation of the dam, as was the case at the Minatare Dam site, this being quite a common condition throughout this western territory.

There has been so far practically no trouble whatever on this project with dam facings constructed of layers of unscreened material overlaid with screened gravel or spalls, on top of which was placed loose rock paving. This method of paving has proven an excellent protection at the Pathfinder Dike, and also at Lake Alice, where practically no repairs have been necessary since those dikes were built, approximately seven years ago. It is judged, however, from our experience at the Minatare Dam that the weakness of such concrete paving may be overcome on new construction by adopting the method of building continuous slabs from the bottom to the top of the facing, reinforced suitably with steel and with concrete ribs placed under the joints between these courses. This protection would probably be unnecessary, however, where a 12-inch layer of screened gravel or spalls is placed as a foundation course for the block or slab facing.

"This new lot of recruits is the worst yet, sir. I had them resting near the bank of the canal, and I gave the command, 'Fall in!' and all that happened was a big splash."

Caller—Did you folks raise any potatoes in your garden this summer?

Hostess—No; you know our garden is flat and you have to raise potatoes in hills.



## ENGINEERING LIBRARY.

Washington Office, U. S. Reclamation Service.

By W. I. Swanton, U. S. R. S.

One morning recently two European engineers, members of a large party investigating the commercial and industrial resources of this country and traveling on a carefully prepared itinerary, visited the Reclamation Service offices at Washington, D. C. So interested were they in the reports and data placed at their disposal in the Engineering Division that in the afternoon the entire party, which had planned to visit other important works, returned and spent a large part of the day studying the engineering and cost data, project histories and photographs, and a set of Mr. Blanchard's engineering films depicting construction work on the reclamation projects was shown them.

A few days ago a hydraulic engineer from one of the northern European countries, who had called on us almost a year before and had since visited many of our projects, dropped in to secure some recent reports and bulletins before sailing for Europe.

These are but two of many similar incidents occurring in the Washington office, showing the interest in the water power and irrigation resources of the United States. During the last few years nearly a hundred engineers and officials of foreign countries have called at the offices of the United States Reclamation Service, and the list of countries represented includes nearly all parts of the world—Europe, Asia, Africa, Australia, and South America.

In response to the demands of our own engineers and officials there have been collected a large number of volumes of engineering books, project histories, and reports, forming a reference library of several thousand volumes. A unique feature of this engineering library is the project history section with its more than 1,000 volumes of project histories (in manuscript), specifications, plans, photographs, and cost data.

In a general way the library can be divided into six sections, as follows:

- Engineering section.
- Project history section.
- Public document section.
- Departmental section.
- State publications section.
- Periodicals section.

*Engineering section.*—This section contains about 400 carefully selected books on irrigation and engineering subjects and includes such works especially relating to irrigation development, connected with the Reclamation Service, as follows:

- Conquest of arid America; Wm. E. Smythe.
- Irrigation in the United States; F. H. Newell.
- Irrigation engineering; H. M. Wilson.

- Irrigation institutions; Elwood Mead.
- Principles of irrigation practice; J. A. Widtsoe.
- Construction of masonry dams; Chester W. Smith.
- Principles of irrigation engineering; F. H. Newell and D. W. Murphy.

- Working data for irrigation engineers; E. A. Moritz.
- Irrigation in the United States; Ray P. Teele.
- Use of water in irrigation; Samuel Fortier.
- Irrigation and settlement in America; A. D. Lewis.
- Irrigation practice and engineering, three volumes; B. A. Etcheverry.

- Irrigation management; F. H. Newell.
- Reclaiming the arid west; George Wharton James.
- Irrigation works constructed by the United States Government; Arthur Powell Davis.

- Operation and maintenance of irrigation systems; S. T. Harding.

- Irrigation engineering; A. P. Davis and H. M. Wilson.

*Project history section.*—The Reclamation Service is one of the few bureaus of the Government which is engaged in investigating, constructing, operating, and developing engineering works and settlements on a large scale, and each year the managers of the 30 or more projects thus being developed compile and forward in manuscript form a history of the project activities during the past calendar year. The history is divided into chapters, as follows:

- Chapter.
- 1. Introductory and general.
- 2. Clerical work (includes fiscal).
- 3. Engineering and investigations.
- 4. Surveys.
- 5. Construction (with photographs).
- 6. Drainage.
- 7. Hydrometry.
- 8. Operation and maintenance, irrigation system.
- 9. Operation and maintenance, power system.
- 10. Litigation.
- 11. Health and sanitation.
- 12. Water users' associations and irrigation districts.
- 13. Future work.
- Appendix, with specification data and operation and maintenance forms.

These histories and the separate feature reports form a valuable record of achievements of the service and are filed, by projects, on shelves for convenient reference.

*Public document section.*—In the new edition of the list of publications of the service just issued over 400 congressional hearings, reports, and documents in regard to the Reclamation Service are listed, and copies

of these reports are filed on shelves in chronological order for reference. Many of the hearings contain much valuable information on the irrigation projects and their development, in connection with testimony given by the director and others before the House and Senate Committees on Appropriations and Irrigation. The director and other officials of the service, in their official capacities or as representatives of other organizations, have testified before congressional committees in connection with rural credits, flood control, adequate salaries in the Patent Office, and the advantage of a national budget of appropriations for the Federal Government system, and these hearings and reports are included. The Reclassification Report (H. Doc. 686, 66th Cong., 2d sess.), containing specifications of all positions in the Federal Service, including the United States Reclamation Service, is also included.

*Departmental section.*—This section of the library includes in addition to the water-supply papers of the Geological Survey and the reports of operations of the Bureau of Soils—the essential land and water reports issued by the Government—current annual reports and bulletins of the various departments and bureaus of the United States Government needed for reference in answering the numerous inquiries received by telephone or correspondence. The water-supply papers now number over 400, the reports of operations of the Bureau of Soils, including soil maps and separates, now number several hundred, and in addition fairly complete files of the Year Books of the Department of Agriculture, annual reports of the Office of Experiment Stations, annual reports of the Geological Survey, and the Statistical Abstract of the Department of Commerce are maintained, besides many other departmental publications.

*State publications section.*—The investigations of the Reclamation Service in connection with the proposed soldier settlements authorized by Congress for the fiscal year 1919 for the first time brought the engineering activities of the service east of the Mississippi River, and in connection with this work there have been collected several hundred valuable publications issued by State engineers, State geologists, State experiment stations, and other State agencies which are filed alphabetically, by States, in convenient shape for reference.

*Periodical section.*—In view of the fact that the large scientific library of the Geological Survey is located in the Interior Department Building and that the Congressional Library with its nearly 3,000,000 volumes is reasonably accessible, it has not been the policy of the service to purchase a large number of books or subscribe for many of the engineering periodicals. However, a few of the leading engineering periodicals are kept on file in bound volumes, and a list of the articles in these volumes about the

work of the Reclamation Service is published at intervals for convenience of reference. Complete files of the Panama Canal Record, the Alaska R. R. Record, the Barge Canal Bulletin, the Miami Conservancy Bulletin, and, of course, our own RECLAMATION RECORD are also kept in this section, and altogether about 25 different periodicals are received.

*Card indexes.*—As rapidly as possible these various books, pamphlets, and reports are being indexed in order to make the contents readily available, and card indexes are maintained of the library proper, of the engineering articles of interest about the service, and of the drainage data secured in connection with the investigations above referred to which covered in a general way the entire United States. The service receives regularly as issued the Congressional Library cards of irrigation books, and also those on drainage which are a part of the large Congressional Library card index. These card indexes form a fairly complete record of all the more important books, including foreign, on the subject of irrigation and drainage.

It is desired as far as possible to make conveniently available all engineering data on the subject of irrigation in the United States, especially in connection with the Government irrigation projects. It is realized that it is impossible to include all the data in one small reference library, but the ideal that is sought to be attained is to make directly available such data as the service has, and by means of card indexes facilitate reference to other sources of information on the subject of irrigation in the United States and foreign countries, in the interest of efficient construction and operation of our own irrigation projects for the benefit of the water users and for the advancement of the engineering profession.

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| 14. Morris Bien.             | 44. Miss Sallie A. B. Coe.  |
| 15. Charles H. Fitch.        | 45. Jesse A. Moss.          |
| 16. Anton H. Gullickson.     | 46. Mrs. Mamie Lamb.        |
| 17. Charles N. McCulloch.    | 47. Loring O. Mills.        |
| 18. Thomas E. Brown.         | 48. Thomas P. Jordan.       |
| 19. John H. Pellen.          | 49. Raymond Depue.          |
| 20. Miss Mirian K. Eastburn. | 50. Jesse W. Myer.          |
| 21. Miss Bessie H. Burwell.  | 51. Leonel E. Reichard.     |
| 22. Miss Esther Bondaroff.   | 52. Andrew M. Smith, jr.    |
| 23. Mrs. Louella Littlepage. | 53. Paul J. Leverone.       |
| 24. Mrs. Ella W. Ballard.    | 54. William H. Dodge.       |
| 25. Miss Regina C. Watkins.  | 55. Daniel C. Barrett.      |
| 26. Mrs. Minnie E. Reed.     | 56. John C. Mulford.        |
| 27. Percy I. Taylor.         | 57. Harold Rocker.          |
| 28. Charles A. Bissell.      | 58. James E. Golladay.      |
| 29. John B. Beadle.          | 59. George W. Keane.        |
| 30. Walter I. Swanton.       |                             |



# BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture, Washington, D. C.

## FARMERS' BULLETINS.

No. 1093. *Influence of the tractor on use of horses.*—For what operations can I use the tractor? In what operations will it displace horses in whole or in part? How many horses will it displace on my farm? This illustrated bulletin will help you to answer these questions.

No. 1126. *Sudan grass.*—About all there is to know about this grass is included in this illustrated bulletin, including a section on its value in irrigated regions.

No. 1134. *Castrating and docking lambs.*—This bulletin discusses how these operations may be done safely and effectively on the farm.

No. 1139. *A method of analyzing the farm business.*—Is your crop area properly proportioned to the various crops with regard to profits? How do your crop yields compare with the average yields of the locality? Is your farm so organized that each part of the business is yielding satisfactory returns? This bulletin outlines a system of analyzing the farm business designed to help the farmer answer such questions as the above, and thus locate the strong and weak points in his plan of management.

No. 993 (revised). *Cooperative bull associations.*—Cooperative bull associations are formed by farmers

for the joint ownership, use, and exchange of pure-bred bulls which they could not own individually. Records show that the pure-bred animal is more profitable than the grade. The bull association makes high-priced pure bred animals available to the average farmer.

No. 713 (revised). *Sheep scab.*—This illustrated bulletin gives full information as to the nature of the disease and the means of eradication.

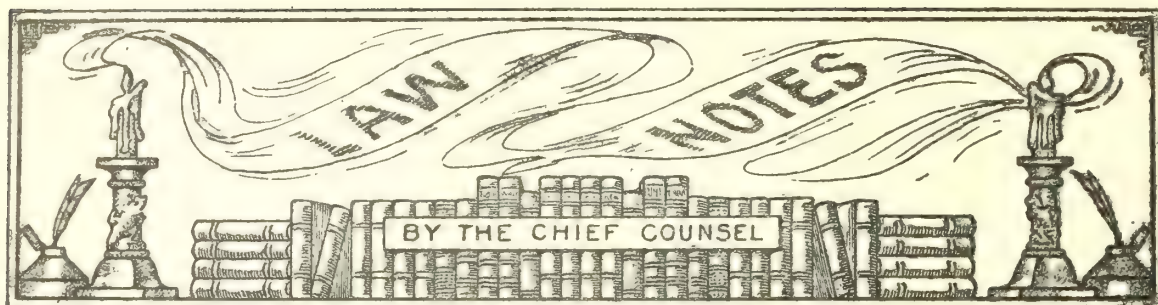
No. 511 (revised). *Farm bookkeeping.*—Adequate records are necessary to the efficient management of any business. The farmer, to be successful, must be a business man as well as a grower of crops and producer of live stock. As a business man he should have suitable business records. It is the purpose of this bulletin to outline the principles of simple farm bookkeeping.

No. 739 (revised). *Cutworms and their control in corn and other cereal crops.*—Cutworms cause serious losses to corn and other cereal crops every year in some part of the United States. This bulletin gives measures for their control.

No. 1131. *Tile-trenching machinery.*—The cost of trenching by machinery is not greatly different from that of handwork. The main advantages of machine work over hand labor are the fewer men required and the more rapid completion of the work.







## GOVERNMENT WATER RIGHTS IN MONTANA.<sup>1</sup>

By Willis J. Egleston, District Counsel, U. S. R. S.

As long ago as 1904 when the United States Reclamation Service was in the process of organization—only two years after the passage of its organic act and before any irrigation water had been put to beneficial use under a Government project—Mr. Morris Bien, then supervising engineer in charge of land and legal matters, at a conference in Ogden, Utah, called attention to the fact that the conditions in the Western States respecting the Government's water rights, as well as those of individuals, were anomalous, in that two sovereignties were operating in one jurisdiction.

The Reclamation Service came into being under the act of June 17, 1902 (32 Stat., 388), and is a bureau of the Department of the Interior having for its object the reclamation of the arid public lands—and incidentally other lands—and the disposal of such reclaimed public lands with water rights appurtenant thereto.

The act of June 17, 1902, at section 8, provides—

That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from, any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right.

There is, however, nothing in the act of 1902 which authorizes or directs the Secretary of the Interior to appropriate water. The steps taken by the service through its project managers, who give notice to the

world of the intentions of the United States with regard to the use of water upon the public domain, have been referred to frequently as the appropriation of water by the United States, and this has given rise in the minds of many to the idea that the United States is required to appropriate water and to acquire its rights as such by observing the procedure enacted by State legislatures for the guidance of individuals and others who are subject to State laws. It is true that said section 8 of the reclamation act directs the Secretary to proceed in conformity with State laws, and this is done in all cases where the State laws are involved. Also it is true that the State procedure for the condemnation of lands under judicial process is observed in the Federal court, and the State law with regard to the execution and recording of instruments and the conveyance of title to property is followed by Federal officials. These practices of convenience, however, are not a true index of what the Government's actual rights are.

We contend that the United States, both as a sovereign and as a proprietor, is the owner of all surplus, unappropriated waters in the States in which the Reclamation Service operates, subject, however to all appropriations made in accordance with local laws, customs, and decisions of the courts.

The act of July 26, 1866 (14 Stat., 258), section 9, provides:

Whenever by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes have vested and accrued, and the same are recognized and acknowledged by the local customs, laws, and decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes herein specified is acknowledged and confirmed: \* \* \*

The Montana constitution provides in section 15 of Article III:

The use of all water now appropriated, or that may hereafter be appropriated for sale, rental, distribution, or other beneficial use, and the right of way

<sup>1</sup> Abstract from an address to the conference of the northern division of the Reclamation Service held at Bozeman, Mont., January 12-17, 1920.



WILLIS J. EGLESTON,

District counsel, United States Reclamation Service, Helena, Mont. Born in Fillmore, Minn., May 30, 1872; attended University of Wisconsin; graduated from the law department, University of Minnesota, and admitted to the bar of that State in 1896; practiced law in Minneapolis; employed three years in Minnesota tax and mortgage investigation; law editor for one year with West Publishing Co., St. Paul; employed six years in Census Bureau; transferred in 1906 to legal division of the Reclamation Service. Is at present field legal adviser for Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary storage, Sun River, North Dakota pumping, Lower Yellowstone, and Shoshone projects.

over the lands of others for all ditches, drains, flumes, canals, and aqueducts necessarily used in connection therewith, as well as the sites for reservoirs necessary for collecting and storing the same, shall be held to be a public use.

The statutes of Montana, as well as those of other Western States, set forth, following constitutional authority, an orderly procedure for the acquisition of water rights—either by application to and permit from a designated office or officer, or by a notice of the taking and use of water—an appropriation, to be adjudicated by or defended in the courts when necessity arises. These State laws and constitutional provisions, read in connection with section 8 of the reclamation act, are commonly misinterpreted as a requirement placed upon the United States to make its appropriation of water under and by virtue of the State laws.

The power of Congress under the Constitution of the United States to dispose of or to reserve for public uses its lands and, as an integral part thereof, its waters is subject to no limitation. Congress gave the right to individuals under the act of 1866 to acquire title in the Government's water, and Congress can take away that right in respect to the surplus undisposed of waters of the United States. Instead of prescribing compliance with local customs and laws, Congress can, if it sees fit, prescribe a water code different from any which now exists, and can compel compliance therewith by all persons who seek to acquire vested rights in the surplus unappropriated waters of the United States. But Congress has not seen fit to assert its full powers in the reclamation act. It inserted the clause in section 8 under discussion simply as a reaffirmance of the policy announced first in 1866.

The laws of the States relating to the control, appropriation, use, and distribution of water used in irrigation, mentioned in the first part of said section 8, are State laws effective under the act of 1866, and under the State's general police power over the property of its citizens granted to the citizens by the United States upon the express condition of compliance with local customs, laws, and decisions of courts. No one questions such police control by a State over the property of its citizens; but when it comes to a conflict between police control by the State and the police control of Congress over the property of the sovereign Nation, the United States of America, then "that which is not supreme must yield to that which is."

It is only when carrying out the provisions of the reclamation act that the Secretary shall conform with the provisions of the laws of the State relating to irrigation. The provisions of the act to be carried out by the Secretary are as above stated and do not anywhere mention the appropriation of water. Members of Congress, including the committee reporting on the reclamation act, at the time of the passage thereof, refer to this part of section 8 as follows: "Under this section uniformity of record of the right is secured."

The Secretary, under section 7 of the reclamation act, may buy or condemn water, but he is not directed or authorized to attempt any appropriation of water. Some say that appropriation is an implied necessity, for otherwise how is the Government to acquire title to the needed water. The answer is that the title to the surplus unappropriated water is already in the Government. In the language of the Supreme Court of Montana, in *Story v. Woolverton* (31 Mont., 346):

It was therefore unnecessary for the Government to "appropriate" the water. It already owned it. All it had to do was to take and use it.

Section 8 of the reclamation act does not contemplate an invasion of any of the rights of the Federal Government. The third clause of the section specifically provides that Federal rights shall not be interfered with.



A more complete statement of this third clause would read as follows:

1. And nothing herein shall in any way affect any right of any State.

2. And nothing herein shall in any way affect any right of the Federal Government.

3. And nothing herein shall in any way affect any right of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof.

The last part of this third clause protects users of water outside of the State where the Secretary of the Interior is constructing and operating an irrigation project in general conformity with the local laws of the State where the project is located. For illustration: The operation of the North Platte project in Wyoming under Wyoming water laws might be very harmful to the water users in Nebraska taking water from the North Platte River, an interstate stream. This construction seems to have been in the mind of the congressional committee when it made the following explanation of this clause: "It also provides that nothing in the act shall be held as changing the rules of priorities in interstate streams." That has reference to the priorities of individuals only. Nearly every Federal irrigation project is situated on and uses the waters of an interstate stream, which is also an international stream in some cases.

Attention is called to the fourth part of section 8, which provides that the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure, and the limit of the right. This provision about water being appurtenant to the land sounds reasonable and mild. But it is an authoritative assertion of absolute Government ownership and control of the surplus, unappropriated waters in the West. For in some States by local customs, laws, and decisions of courts, water is not appurtenant to the land. The Government can make and enforce this only under the rule of law that the surplus and unappropriated waters belong to the United States, and, when reserved and set aside for governmental irrigation purposes, are the absolute property of the United States, to be disposed of as the United States sees fit under the constitutional "power to dispose of and make all needful rules and regulations respecting the territory and other property belonging to the United States."

The last portion of section 8, regarding beneficial use being the basis, the measure, and the limit of the water right, is in conformity with the policy of the act of 1866 and the express conditions of the desert-land act of 1877, and is an additional assertion of the Government's ownership and control, in that Congress directs that its rule, and not local laws, shall govern. This will serve as a basis for the establishing of a

reasonable duty of water in States where excessive appropriations have been allowed.

Nowhere in section 8, or in any other section of the reclamation act, do we find that Congress has surrendered or granted away any water rights of the United States, except to reaffirm and protect its water grants to individuals under the provisions of the acts of 1866, 1870, and 1877; nor has it relinquished its paramount police control over the real property rights of the United States; but we do find positive assertions to the contrary, as above mentioned.

The Secretary of the Interior, by a directory but not mandatory provision, in carrying into effect the provisions of the reclamation act shall proceed in conformity with State laws relating to the control, appropriation, use, and distribution of water used in irrigation by the individual citizens, so long as such conformity does not in any way affect any right of the Federal Government.

The Government does not have to appropriate its own water in order to vest a title in itself to that already owned by it. All it has to do is to reserve, take, and use its own water for its own purposes; or, as the reclamation act says, to divert the Government's water through the Government's works upon the Government's lands. The Government can not be forced into water adjudication proceedings or into any litigation to protect its reserved water rights. Congress has never given its consent that the United States should be made a party defendant at the whim of every water claimant who desires to use the machinery of a local court to determine his individual water claims as against the Government. When the Government sees fit it can obtain court decrees as to water rights of individuals conflicting with those of the United States by bringing a suit in equity in the Federal court in the nature of an action to quiet title; and by the decree therein the full water rights of the United States will be declared and placed of record.

The point is frequently raised that the United States by its enabling act establishing the State and approving the adoption of its constitution thereby acquiesces in the assertion that the State owns the water within its borders. But let us see.

It is sometimes contended, though never successfully, that an act of Congress approving a State constitution is somewhat in the nature of a grant or does in fact grant away Government property rights. The Supreme Court of the United States, on May 29, 1911, through Mr. Justice Lorton, in reference to the Oklahoma constitution, which had been supervised and ratified by Congress, said:

A constitution thus supervised by Congress would after all be a constitution of a State, and, as such, subject to alteration and amendment by the State after its admission. Its force would be that of a State constitution, and not that of an act of Congress. (*Coyle v. Smith*, 221 U. S., 559, 568; *Ex Parte Webb*,

225 U. S., 663, 690; *Wilcox v. McConnell*, 13 Pet., 498, 516; *Cooley Constitutional Limitation* (7th ed.), p. 56.)

The United States Constitution is a grant of powers; State constitutions are not grants of powers, but limitations. The textbooks are written on constitutional limitations. The Supreme Court of Colorado quotes with approval Mr. Cooley upon the subject of the functions of a State constitution:

It is not the beginning of a community nor the origin of private rights. It is not the fountain of law nor the incipient state of government \* \* \*. It grants no right to the people, but it is the creature of their power, the instrument of their convenience. (*Packer v. People*, 8 Colo., 364-365; 8 Pac., 564.)

The Attorney General of the United States, in his annual report to Congress, dated December 7, 1914, said:

The department takes the position that in the arid and semiarid regions, where the legality of diverting and appropriating water for beneficial uses on non-riparian lands is generally established, the original right of the Government to appropriate surplus water for its own uses, particularly for the reclamation of its enormous holdings of arid lands, has not been surrendered by any act of Congress or divested by the mere creation of the States into which those regions have now become incorporated. This position has been sustained by one of the district courts of the State of Colorado. Its soundness has been challenged by certain claimants who would have the Federal user dependent on the permission of State laws. The question, never passed on, I am advised, by the Supreme Court, seems very important theoretically, but in practice it has hitherto been obviated by the general identity of interests, and the disposition of the Government to follow the State administrative procedure wherever practicable.

Citations of many State and Federal court cases and dicta and decisions of the Supreme Court of the United States might be set forth at length in support of the Attorney General's position.

When we turn to the laws of Montana, as compared with the laws of most of the other Western States, we find that we confront some difficulties and complications, even though we should be required to "proceed in conformity with State laws."

In order to make easy the observance of the procedure set down in the Montana Statutes, the legislature, at the instance of the Reclamation Service, enacted a law on February 27, 1905 (sec. 4846, Rev. Stats., 1907), which provides that an appropriation made by the United States shall be valid—

for the period of three years after the filing of the notice of appropriation thereof in the office of the county clerk and recorder of the appropriate county, but such appropriation shall be null and void after the period of three years unless prior to the expiration of such period the work of constructing the canal or ditch by which the same is to be diverted shall have been commenced.

There is a provision also that an abandonment may be declared by the United States by the filing of a

notice in the same manner in which the appropriation is recorded.

Kinney on Irrigation and Water Rights, second edition, says concerning Montana water laws:

The State of Montana has not kept pace with her sister States so far as legislative enactments are concerned governing waters, their appropriation and distribution. The method of appropriation is somewhat antiquated, and no water or irrigation code, as the same is known in other States, has been enacted. \* \* \* The statutes of the State of Montana leave one in doubt as to whether riparian rights are abrogated in Montana or not.

Long on Irrigation, second edition, says in section 206: "There is in Montana no general system of public control such as is found in most of the irrigation States," and in section 18: "Until recently it was perhaps an open question as to what was the doctrine in Montana concerning water rights." This refers to the question as to whether or not the doctrine of riparian rights has been abrogated and whether the doctrine of appropriation applies fully.

Mr. A. E. Chandler, formerly a member of the legal staff of the Reclamation Service and later a member of the faculty of the University of California, says in *Elements of Western Water Law*, on page 148, in speaking of the modern system of recording water rights:

In those States using the old method of posting notices the records are useless as evidence of work actually done, and one is never certain of the status of his right during construction.

The status of water rights in Montana is therefore dependent to a much greater degree upon judicial determination than upon private interpretation of the statutes. It seems that there is basis for almost any sort of contention if one were to look far enough into Montana laws and decisions, but the trend of decisions is toward the sanctity of appropriations and the priorities based upon beneficial use. What is known as the Sun River Decree probably most nearly approaches the ideal which can be obtained under the Montana statutes, because of the limitation which is placed upon every right decreed therein, as follows:

That, relative to all the appropriations herein decreed, the amount of water used under and by virtue of each appropriation shall be limited to amount heretofore appropriated and applied to beneficial use, which shall be the basis, the measure, and the limit of the right of each of the parties named to the use of said waters so appropriated and decreed.

It may be interesting to observe what the State itself, speaking through its properly accredited officials (the Montana Irrigation Commission) thinks of its own legislative enactments and the procedure thereunder. I quote from a publication of that commission issued less than six months ago:

Montana has no regular code of irrigation laws; those that have been passed piecemeal have for the most part been to define methods of appropriations



and measurement. The extraordinary session of the legislature assembled during the summer of 1919 appointed a committee of five senators to examine the water-right laws of Montana and to report back to the next regular session. It is probable that they will draft a complete revision and the law may be amended to meet present conditions in 1921.

Under the present law notices of appropriation are posted at the point of diversion and filed for record in special books with the county clerk; no limit is placed upon the amount an individual may appropriate, and as a consequence most of the Montana streams have been appropriated to amounts many times their flow. A failure to post or file the notice does not invalidate any rights, however. In case no notice is posted the priority will be dated from the time of actual use. If the procedure for posting and recording is followed the priority dates from the time of posting, if due diligence is used in construction and application. Rights can be held only to the amounts actually used, an amount much less generally than that claimed in the notice.

Most of the legal practice covering reasonable diligence, abandonment, etc., is the result of precedents established in actual legal cases. Being largely matters of intention and fact, they have been left to determination from the evidence in specific instances. The law allowing all users of the waters of a stream to be made parties to any suit involving such waters, without specific legal cause for action, has done much to expend the value and completeness of decrees. The law defining the method of legalizing appropriations subsequent to a decree keeps the decree up to date without involving rights already defined. A decreed water right is not appurtenant to the land in this State, and the place of diversion and use may be changed without loss of right. Anyone injured by reason of such changes has the usual methods of recovery.

It should be plain then that when instructions are issued to project managers, as set forth in the Service Manual, for a particular procedure in the posting and recording of notices of intention to take and use water in connection with projects proposed or now under construction, a policy of the service is being observed, which policy provides not only an assertion of the right of the United States, but a notice to landowners in the vicinity and a courtesy to the State. The State is not left in the dark as to the intentions of the Government regarding its property within the State boundaries. When the Government elects, as it may, to allow the State courts to include a list or record of its rights in an adjudication decree it should and will evidence such election by some act or utterance, in the absence of which the rights of the Government are not affected by the decree. But the policy of the service has been and will usually be to see that such decrees are accurately stated and then will not disclaim them. The policy of the service also is to claim only such waters as can be and will be used within a comparatively short period.

The influence of the Reclamation Service has been to stimulate greatly the interest in private irrigation and the Government will not hold out of use any water which private interests are able and ready to

use for irrigation when the prospective Government use is likely to be long delayed.

I quote from a recent letter of instruction to a project manager of the Reclamation Service, which letter sets forth the Government policy in this regard in very definite language:

Assuming that if the United States does not continue its filing of appropriations for the canal in question, some other irrigation developments in Montana may use the water which would be appropriated if the Government canal is built. It appears that this would be a reason for not making a filing, as it is not the policy of the United States to attempt to retard irrigation development, but merely to protect itself when beginning the construction of an irrigation project. In other words, when the United States is preparing to construct a project it necessarily must, before beginning construction, take such measures as are necessary to protect the water rights for the lands under the canals to be constructed. If it appears probable that a private enterprise will construct a project on a certain river unless the United States interferes, such interference should be the last thing contemplated, and every encouragement for such construction should be given unless it interferes with works under construction by the United States.

It must not be inferred from anything which has been said that the procedure of posting notices on unadjudicated streams and the recording in the county within the statutory period has been modified in any degree. On the contrary, as settlement continues and the water becomes more valuable the greatest care should be taken that the Government rights should be asserted in the prescribed manner and protected. Record notice should be given until construction begins, and thereafter if construction is interrupted for any considerable period.

It is fitting to say here that the differences of opinion between representatives of the service and State officials which were so evident a few years ago have largely disappeared. A good quality of cooperation now exists, and with the adoption of a new and up-to-date water code by the forthcoming session of the legislature it is to be hoped that the Federal Government and the State authorities may work hand in hand in a mutually profitable partnership, to the end that every drop of water now going to waste may be used upon these Montana lands, and that "beneficial use may still be the basis, the measure, and the limit of the right."

### BE A BOOSTER.

Boost and the world boosts with you,  
Knock and you're on the shelf,  
For the booster gets sick of the man who kicks  
And wishes he'd kick himself.

Boost when the sun is shining,  
Boost when it starts to rain,  
If you happen to fall, don't lie there and bawl,  
But get up and boost again. —Exchange.

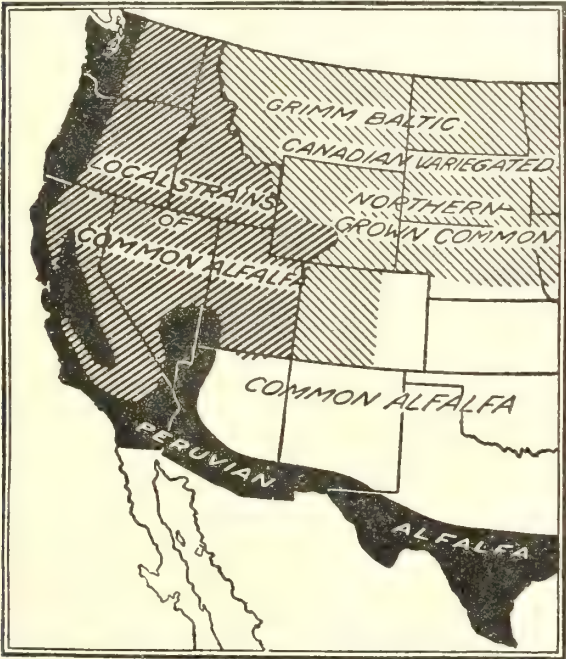
IRRIGATION STATISTICS, FOURTEENTH CENSUS.

The Director of the Census announces, subject to correction, the following preliminary statistics on irrigation for the counties named. Similar statements for other counties will be issued as soon as the figures are available and will be published from time to time in the RECLAMATION RECORD.

Irrigation by counties, 1920 and 1910.

State and county.	Acreage to be irrigated by works either completed or under construction.			Acreage to which existing works are capable of supplying water.			Acreage irrigated.			Acreage available for settlement in 1920. <sup>1</sup>
	1920	1910	Increase.	1920	1910	Increase.	1919	1909	Increase.	
Colusa County, Calif.....	91,073	18,783	72,290	71,274	16,541	54,733	46,022	4,276	41,746	.....
Glenn County, Calif.....	195,889	220,664	<sup>2</sup> -24,775	120,577	16,804	103,773	100,284	5,661	94,623	16,030
Lake County, Calif.....	1,811	1,268	543	1,497	828	669	1,087	582	505	.....
Mendocino County, Calif.....	1,736	1,365	371	1,666	590	1,076	1,362	371	991	.....
Orange County, Calif.....	109,341	71,444	37,897	98,740	63,486	35,254	89,060	55,056	31,004	4,236
San Diego County, Calif.....	68,170	45,535	22,635	31,931	31,205	726	24,799	24,944	<sup>3</sup> -145	8,772
Stanislaus County, Calif.....	375,814	340,914	34,900	205,038	141,785	63,253	200,677	84,015	116,662	76,993
Inlare County, Calif.....	657,149	466,735	190,414	551,182	337,938	213,244	327,591	265,404	62,187	22,581
Alamosa County, Colo. <sup>4</sup> .....	158,458	.....	.....	154,225	.....	.....	75,905	.....	.....	72,000
Garfield County, Colo.....	111,916	131,321	<sup>5</sup> -21,405	90,264	95,281	<sup>5</sup> -5,017	69,983	61,617	8,366	6,040
Mesa County, Colo.....	184,272	182,942	1,330	134,067	92,092	41,975	101,722	71,942	29,780	40,216
Moffat County, Colo. <sup>6</sup> .....	29,537	.....	.....	21,494	.....	.....	15,859	.....	.....	.....
Rio Blanco County, Colo.....	45,331	53,169	<sup>5</sup> -7,838	32,492	37,353	-4,861	27,865	32,830	-4,965	.....
Routt County, Colo. <sup>6</sup> .....	93,133	.....	.....	61,098	.....	.....	50,650	.....	.....	.....
Routt & Moffat Counties, Colo. <sup>7</sup> .....	122,670	157,298	<sup>5</sup> -34,628	82,592	110,569	-27,977	66,509	62,427	4,082	.....

<sup>1</sup>To be supplied with water by works either completed or under construction.  
<sup>2</sup>Decrease due to failure of a large scheme which has been only partially realized. The figures show a large increase in actual development.  
<sup>3</sup>Decrease.  
<sup>4</sup>This county was organized in 1913 from parts of Conejas and Costilla Counties; consequently no comparative figures for 1910 can be given.  
<sup>5</sup>This county was organized in 1911 from a part of Routt County; consequently no comparative figures for 1910 can be given.  
<sup>6</sup>Routt County was divided in 1911, Moffat County being organized from its western part.  
<sup>7</sup>Data for these counties combined compared with those for same territory in 1910.



Map of western portion of the United States, showing the varieties or strains of alfalfa that in general are recommended for the various sections. From Dept. Circ. 93, U. S. Dept. of Agri.

UNITED STATES CIVIL-SERVICE EXAMINATIONS.

Engineering Draftsman, \$1,200-\$3,000; Topographic Draftsman, \$1,200-\$3,000.

September 21, 1920.

The United States Civil Service Commission announces open competitive examinations for the positions listed above. Vacancies in the Reclamation Service at salaries ranging from \$1,200 to \$3,000 a year, and in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

Subjects:	Weights.
1. Drafting (rated on samples of work submitted by applicant).....	40
2. Education and experience.....	60
Total.....	100

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

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HUGH A. BROWN, EDITOR.

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#### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

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U. S. Reclamation Service,

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I still receive that good little publication, the RECLAMATION RECORD, and it is both instructive and interesting. The Government does a good work in issuing such publications; they are a great help.—*From Republic, Washington.*

## JULY WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

July, 1920, in the Western States was drier and hotter than normal, as a rule, but considerably more favorable in the Northwest than July of 1919 had been. In most northern districts there was no material break in the hot weather, but there was considerable cool weather in the middle and southern parts of the Rocky Mountain and Plateau regions early in the month and in California and Nevada about the middle. The month averaged particularly warm, at places 5° to 6° above normal, in Montana, Idaho, and the eastern parts of Oregon and Washington, and in most other western districts averaged a little above normal temperature, save in most of Nevada and central and northern California, where it averaged slightly below.

In the early part of the month there was important rain in many portions of the Plains and of the southern Rocky Mountain region, and about the 10th in most northern districts, particularly eastern Montana. There was little rain of consequence during the middle portion of the month, save in a few districts east of the Continental Divide. Late in the month there were good rains in many parts of Arizona, southeastern Nevada, and southern Utah, and again in many southern districts east of the Divide. The month as a whole had fairly liberal rainfall for the season in Washington and western Oregon, also in many parts of Montana, in southern Utah and much of Arizona, and in the drainage basin of the Arkansas River from headwaters to south-central Kansas. In nearly all other western districts the month's rains were scanty, particularly in the lowest portions of Arizona, in most of New Mexico and far western Texas, and in central Wyoming, southern Idaho, eastern Oregon, and most of Nevada. California, as usual in midsummer, was almost entirely without showers.

The weather of the month was mainly very favorable for fruit and for truck also, although in several southern districts and in central Wyoming dryland truck suffered from lack of moisture, and in a few localities there was damaging hail. There were a good many districts where the small grain crops deteriorated because of lack of moisture; yet the weather generally favored them and was nearly everywhere good for harvesting and thrashing mature grain. There was some harm to ranges from the dryness, particularly to the lower ranges in the more southern regions and in parts of the northern Plateau; yet live stock was mainly in very satisfactory condition.

WORK AND SAVE. BUY GOVERNMENT SECURITIES.

## MONTHLY PROGRESS REPORTS FOR JULY.

*Monthly condition of principal Reclamation service reservoirs for July, 1920.*

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Elevation of water surface.			
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.	Out-flow in acre-feet.	Beginning of month.	End of month.	Maximum.
Arizona, Salt River.....	Roosevelt.....	1,305,000	2128	1903	1,287,714	1,172,667	1,287,714	158,224	2123.22	2116.01	2123.22
California, Orland.....	East Park.....	51,000	1199.68	1111.68	12,370	6,100	12,370	5,740	1168.91	1158.2	1168.91
Idaho:											
Boise.....	Arrowrock.....	280,000	3211	2956	272,630	149,400	272,630	330,634	3209.7	3159.2	3209.7
	Deer Flat.....	177,000	2518	2488	108,281	60,082	108,281	63,366	2510.5	2503.2	2510.5
Minidoka.....	Lake Walcott.....	95,180	4245	4236	103,380	102,900	106,150		4245.68	4245.64	4245.91
	Jackson Lake.....	847,000	6769	6730	698,480	476,600	746,280	368,856	6763.06	6753.7	6765
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	27,900	28,800	29,800	3,345	2212.2	2212.5	2212.8
St. Mary Storage.....	Sherburne.....	33,000	4765	4720							
Sun River.....	Willow Creek.....	16,700	4130	4085	16,700	15,171	17,054	2,500	4130	4128.4	4130.3
Nebraska-Wyoming, North Platte.....	Pathfinder.....	1,070,000	5852	5670	1,129,130	953,560	1,129,130	332,810	5954.55	5846.62	5854.55
	Lake Alice.....	11,400	4182	4159	11,380	6,567	11,380		4182	4175	4182
	Lake Minatare.....	60,700	4125	4074	42,671	26,169	42,671		4116	4106.1	4116
Nevada, Newlands.....	Lake Tahoe.....	6 120,000	6230	6 6224					6225.98	6225.67	6226
	Lahontan.....	290,000	4162	4060	195,370	151,000	195,370	54,778	4152.9	4146	4152.9
New Mexico:											
Carlsbad.....	McMillan.....	45,000	3267.7	3241.6	44,000	27,250	44,000	26,000	3267.5	3264.3	3267.5
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4231.5	2,092,967	2,059,178	2,147,029	115,055	4392.35	4391.4	4393.87
Oregon, Umatilla.....	Cold Springs.....	50,000	621.5	560	38,700	22,450	38,700	15,967	613.6	599.58	613.6
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	292,000	277,000	292,000	144	4533.2	4532.5	4533.2
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	201,150	190,900	202,680		2974.7	2973.3	2974.8
Utah, Strawberry Vally.....	Strawberry.....	250,000	7558	7517	234,000	214,000	238,000		7556.1	7553.4	7558
Washington:											
Okanogan.....	Conconully.....	13,000	2287	2232	2,214	898	2,214	2,164	2256	2248	2256
Yakima.....	Bumping Lake.....	34,000	3426	3389	39,080	32,675	39,220	6,545	3430	3425.2	3430.1
	Lake Clealum.....	22,800	2134	2122	32,095	27,940	32,340	4,400	2137.4	2135.7	2137.5
	Lake Kachess.....	210,000	2258	2192	229,735	220,505	235,090	14,585	2459.9	2457.1	2461.1
	Lake Keechelus.....	152,000	2515	2425	147,175	71,810	149,420	77,610	2512.8	2476.8	2513.7
Wyoming, Shoshone.....	Shoshone.....	456,600	5360	5132.3	479,663	467,367	483,805	327,419	5363.4	5361.6	5364

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> Proposed regulation.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—

Water was run in all of the canals during July. The demand for irrigation water was very heavy, due to the lack of summer rains.

There were six maintenance crews in the field, and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 336; average head of stock, 74; miles main canals cleaned, 56½; miles laterals cleaned, 229½; number of new structures installed, 15; number of old structures repaired, 224; riprap placed, 2,400 feet; concrete placed, 23½ cubic yards; dirt fill placed, 1,290 cubic yards; concrete pipe laid, 402 feet; corrugated pipe laid, 75 feet.

The protective work on the left bank of the Arizona Canal, 2,000 feet below Granite Reef, was completed. This consists of cobble stone paved wall 985 feet long extending into the rock at base and 3 feet above flood line and involved the laying of 2,935 square yards of grouted paving.

The *Ruth* (dredge) removed berm from the south bank of the north branch of the Highline Canal for a distance of 5¼ miles, moving approximately 3,800 cubic yards.

The P. & H. one-half yard dragline worked on the Western Canal above the Highline pumping plant, removing silt from the canal for a distance of 2½ miles upstream from this point.

The Marion three-fourths yard dragline was put back into commission on the 24th and is now en-

gaged in excavating for spillway on Consolidated Canal about 1 mile below the power house.

*Operation of power system.*—The total power generated during the month was 7,862,370 kilowatt hours.

The Roosevelt and Cross Cut power plants operated continuously during the month. The South Consolidated plant operated 97.7 per cent of the month, the Arizona Falls plant 97.5 per cent, and the Chandler plant 95 per cent.

The substations all operated with no trouble. All pumping plants were available when needed, except the San Francisco plant, which was taken out of service and part of the equipment moved to the Highline plant.

*Construction work.*—Construction work on the south spillway at Roosevelt Dam ceased July 14 when the construction camp was abandoned.

Construction work on the Phoenix-Mesa telephone line commenced on July 26. Two carloads of poles were unloaded, one at Mesa and one at Tempe; 630 poles were roofed and gailed.

*Office.*—The following acreages were entitled to irrigation water service on the first of the month:

	Acreage.	Number of applications.
Permanent.....	172,238.50	4,286
Normal flow.....	2,175.25	670
Temporary.....	19,042.26	114
Town sites.....	3,973.75	6

197,429.76 5,076

—C. C. Cragin.



## YUMA PROJECT, ARIZONA-CALIFORNIA.

July weather conditions were favorable. There was a trace of rain. Labor conditions were fair.

**Construction.**—On the East Drain Lateral of the Yuma Valley drainage the Bucyrus dragline moved 10,818 cubic yards of material from station 33 to station 43.

**Operation and maintenance.**—Thirty-six thousand eight hundred and fifty-two acre-feet of water were delivered to approximately 33,000 acres. In the Yuma Valley, Monighan dragline No. 1 cleaned 6,500 cubic yards of silt from the Central Canal, station 103 to station 146. Monighan dragline No. 2 cleaned 11,000 cubic yards of silt from the West Main Canal, station 1006 to station 1071. The V machine cleaned 16 miles of small laterals.

The *Ruth* (dredger) excavated 3,370 cubic yards in cleaning 3.4 miles of laterals on the Yuma Indian Reservation.

River front operations continued until July 10 when river conditions became stable enough to cease hauling rock; 4,880 cubic yards of rock were placed on the reservation levee and 1,296 cubic yards on the Yuma Valley levee. The steam shovel was removed to the Yuma shops and overhauled. The locomotives are undergoing a general overhauling for next season's work.

The maximum discharge of the Colorado River during the month was 73,000 second-feet; minimum, 19,300 second-feet; and the mean, 43,048 second-feet. The gauge on July 31 was 16.5 with a discharge of 19,600 second-feet. The discharge for the month in acre-feet was 2,646,734.

**Gila River.**—The field survey of the relocation of the railroad around the San Carlos Reservoir was continued during July, and the field work was practically completed at the end of the month. This party will also make a wagon road survey above the high-water line of the reservoir from the present highway to the dam site.

**Boulder Canyon.**—The drill and camp equipment was shipped to St. Thomas, Nev., reaching there about July 18 and the work of hauling it overland, a distance of about 40 miles, from St. Thomas to a point at Boulder Wash, about three-quarters of a mile above the dam site, has been under way and the larger part of the outfit had reached the camp site at the end of the month. Materials for the construction of pontoons are also being taken out to the camp site and the construction of these pontoons will be under way shortly after August 1.

C. C. Fisher, engineer, who has filed charge of this work has been absent on other work the greater part of the month and returned to Yuma on July 27.

**Imperial Valley investigations.**—H. J. Gault, Engineer, arrived from Denver on July 5 to take charge of the Imperial Valley investigations. During the month preparations were made to begin surveys for canals in the Imperial Valley, branching from the proposed all-American Canal, as provided in the Kinkaid bill and in cooperation with the Imperial Irrigation District. It is proposed to make preliminary surveys and estimates on about 350 miles of lines. Supplies and equipment have been ordered for three field parties and efforts are being made to obtain the men for these parties. A work room has been rented in El Centro, Calif., which will be the headquarters for this work.

P. A. Rosendorn, draftsman in the Washington office, visited the project on the 12th and 13th.—*R. M. Priest.*

## ORLAND PROJECT, CALIFORNIA.

Aside from several days at the beginning and the close of the month, temperatures were moderate for July, the weather intervening between these dates being free from high temperatures and severe winds. There was no precipitation at East Park, and only 0.05 inch at Orland. No water for irrigation was available from the natural flow of Stony Creek, project requirements being supplied entirely by draft on storage at East Park Reservoir.

Concrete lining operations were continued until July 15, at which time work was suspended for the remainder of the summer. Approximately three-fourths mile of laterals were lined, involving the placing of 4,100 square yards of lining. The average force employed was 22 laborers and 8 head of stock. Two teams were engaged during the last half of the month in the delivery of 110 cubic yards of gravel for use during the coming fall on South Canal lining. One ton of grasshopper poison was mixed and delivered to water users, the work being discontinued on the 15th, as there was no demand for the material following this date. A force of three men was employed during the latter portion of the month in repairing lining and mowing weeds on the canal and lateral right of way.

Water deliveries were continued to those lands not yet having used their season's apportionment. The amount of water delivered was 2,800 acre-feet and the area irrigated 8,500 acres. The third crop of alfalfa was harvested and the gathering of the almond crop begun. The alfalfa yield was light. The early planting of milo made a satisfactory growth throughout the month.

On July 6 the congressional Appropriations Committee inspected the project. After inspecting the project the party was met by members of the Iron Canyon Project Association and escorted to Red Bluff, where the site of the proposed Iron Canyon Dam was visited. Messrs. Nicamor Cortes and Angel Martinez, Philippine government students in irrigation engineering, were at Orland from July 21 to 27 inspecting project engineering works and studying reports, records, and plans. P. A. Rosendorn, of the Washington office, was on the project July 20.—*R. C. E. Weber.*

## GRAND VALLEY PROJECT, COLORADO.

Seasonable weather prevailed during July and conditions were favorable for outside work of all kinds. Labor was scarce and wages high.

All crops made a rapid growth and conditions at the end of the month were excellent. Thrashing of winter wheat was in progress, with yields running from 25 to 50 bushels per acre. The second cutting of alfalfa has been harvested and the digging of early potatoes was under way. Spring grains are nearly ready to cut, and sugar beets, corn, and tomatoes are making a good growth.

The project irrigation system was operated throughout the month, delivering 12,000 acre-feet of water to approximately 20,000 acres of land under irrigation in the project on the Palisade and Mesa County irrigation districts. A break occurred on July 1 at the Badger flume near the lower end of the Main Canal, which necessitated the construction of a 40-foot extension to the upper end of the flume. Ten days were occupied in making repairs before water deliveries could be resumed to the few farms below the break. With this exception no difficulties were experienced in

operating the system and water deliveries were made to all farms with little interruption. In addition to repairing the Badger flume, the maintenance forces were employed in placing turnouts and weirs, cleaning laterals, and repairing minor breaks.

Drainage construction was prosecuted during the month with two dragline excavators working on the project, and one dragline and one trenching machine in the Grand Valley Drainage District. Two and two-tenths miles of drain were completed, involving 59,000 cubic yards of excavation. The investigation of seeped areas on the project was continued with one survey party.

Visitors on the project during the month were: Prof. O. L. Waller, of the Columbia Basin Survey Commission; P. A. Rosendorn, of the Washington office, and District Counsel J. R. Alexander.—S. O. Harper.

#### UNCOMPAHGRE PROJECT, COLO.

During July conditions were favorable for the growth of all kinds of crop and the maturing of early crops. Only a few light showers interfered with farm work. The first crop of alfalfa hay was put up with only slight damage from rains. The second cutting is being harvested at the north end of the project. The crops have all made the normal growth for this time of year, although late in getting started. The first carload shipments of potatoes were sent to market during the week ending June 25 and commanded a price of \$5 per hundred. Beets as a whole are looking good, but a few fields were thinned and blocked too late to obtain the best results.

Labor has been scarce both for farm and canal work.

The first half of the month there was water enough to run the canals to capacity or nearly so. The latter half of the month some cut was necessary, but the supply as a whole has been ample.

Water was delivered to the canal system with very little interruption. The South Canal was shut out on July 12 for inspection of the Gunnison Tunnel and the concrete lining of the South Canal, all of which were found in fairly good shape.—Porter J. Preston.

#### BOISE PROJECT, IDAHO.

Hot, dry weather prevailed during the month. There was only 0.03 inch of precipitation, which occurred on the 29th in a five-minute interval. Temperatures ranged above normal. Conditions were favorable for plant growth on the irrigated lands.

*Labor.*—Labor conditions were unimproved. There was insufficient help to handle the farm work properly. Construction work and building on the project were retarded by shortage of men and teams.

*Farming operations.*—Owing to lack of help, harvesting of the first crop of alfalfa was not completed until early in the month. The second cutting of alfalfa and the harvesting of grain began the latter part of the month. A few cars of early potatoes were shipped, but movement of this crop was light, owing to unstable market conditions. Exceptional yields of all irrigated crops are being reported, but market conditions are not favorable.

*Water supply.*—The flow of the Boise River dropped from 3,700 second-feet at the beginning of the month to 960 second-feet by the 31st. The run-off for the month was about 64 per cent of the mean for the past 26 years. The total run-off for the first

seven months of the year was 9 per cent less than for the same period in 1919. The amount of water held in the storage reservoirs on July 31 of this year exceeded that on the same date for 1919 by 75,000 acre-feet. Owing to hot, dry weather the demand for irrigation water was extremely heavy throughout the month.

*Operation and maintenance.*—The head in the Main Canal was gradually decreased from 2,440 second-feet to 1,990 second-feet. All of the laterals of the distribution system were operated to full capacity. Moss and weeds made rapid growth and it was necessary to employ a number of men in keeping the ditches clean. No breaks occurred during the month.

*Construction.*—The only construction work in progress consisted of placing a few tap boxes and weirs to supply new lands.

*Drainage.*—Drag lines Nos. 3 and 4 continued to work in the Big Bend and Riverside irrigation districts. Drag line No. 3 was laid up from the 13th to the end of the month on account of work interfering with the delivery of irrigation water.

*Visitors.*—The congressional Appropriation Committee, accompanied by the director and the chief engineer, inspected the project on July 17. P. A. Rosendorn, from the Washington office, visited the project office on July 31.—J. B. Bond.

#### KING HILL PROJECT, IDAHO.

The weather during July was very dry and hot but favorable for growing crops.

Camp 5 was opened up on July 15 and a small force of men employed on the wrecking of the old Deer Gulch flume. During the latter part of the month a part of this camp was moved to the site of the McEachren flume work which will be designated Camp 6. The engineering and clerical forces were engaged on routine work.

On July 11 settlement occurred in the foundation of the Head End flume, which is on a side hill location and has a tendency to slip and settle when saturated. This settlement caused this structure to leak to such an extent that it was necessary to turn water out for a period of five days to repair this flume. Aside from this the King Hill irrigation district maintained a successful delivery of water throughout the month.

One engineering field party was engaged during the month on cross-section profile and location surveys for structures to be built during the coming construction season.—A. M. Raun.

#### MINIDOKA PROJECT, IDAHO.

On the South Side pumping unit delivery of water was carried on the entire month of July. The demand for water continued heavy throughout the month. Three regular maintenance crews, consisting of five to eight men each and several extra crews, were engaged in minor repairs to lateral and to timber structures, and cutting moss. The moss continued to grow in large quantities in the canals, and in spite of the efforts of the field force materially obstructed the flow of water.

Office work consisted of the usual miscellaneous and routine work, stored water delivery, hydrometric computations, and hydrographic estimates for the fiscal year 1922; nineteenth annual report; compiling data for House Appropriations Committee, which visited the project on July 18, subdivisions, costs, etc.

Following the recent visit of the Appropriation Committee, officials of the Reclamation Service held a conference at American Falls, July 19 and 20 to



discuss future work at that point. It was decided to continue the preliminary work and investigations on which the Reclamation Service has been engaged for some months. Borings will be made to determine more definitely the character of the foundations at the dam site. The report prepared for the Appropriation Committee shows that 31 contracts have been signed by various irrigation interests desiring storage capacity in the reservoir. These contracts call for a total of 335,000 acre-feet.

J. M. Gaylord, electrical engineer from the Denver office, visited the Minidoka project on July 21 and 22, and inspected the power system.

Discharge at Howells Ferry amounted to 387,590 acre-feet as compared with 593,530 acre-feet for June. The total diversions to the project amounted to 152,365 acre-feet, being 91,825 acre-feet to the North Side gravity and 60,540 acre-feet to the South Side gravity, of which 44,785 acre-feet were pumped to the South Side pumping unit. The maximum amount of water in the North Side gravity canal was 1,507 second-feet; in the South Side gravity canal there were 1,043 second-feet; the maximum pumped at the South Side pumping stations amounted to 751 second-feet.—*Barry Dibble.*

#### HUNTLEY PROJECT, MONTANA.

Weather conditions during July were about normal. On the 5th and 6th 0.88 inch of rain fell; the remainder of the month was dry. On the 30th and 31st heavy windstorms filled the Main Canal with dry mustard weed, causing considerable trouble keeping the screens at the pumping plant clear. The labor situation was satisfactory, and full crews were maintained.

Supplemental construction consisted of replacing deteriorated wooden structures with structures of permanent type.

The demand for water was very heavy. The rainstorms on the 4th and 5th caused the demand to drop off somewhat, but by the 12th all laterals were filled to capacity. The Main Canal carried 540 second-feet for several days. The auxiliary pumping plant was started on the 14th. No. 1 unit burned out a bearing at 8.30 p. m. July 14, which was repaired and in operation at 9.30 p. m. on the 16th. Both units were then run continuously until the 24th, when No. 1 unit was shut down, No. 2 being stopped at 6 a. m. July 29. On the night of the 20th something went through the trash racks of No. 2 hydraulic unit and completely destroyed the turbine. A new turbine in stock was installed, and the unit was placed in operation 36 hours after the accident. On the night of July 4 a cloudburst at the head of Custer Coulee caused considerable damage to the approaches to the flume crossing the Main Canal near Osborn. The approaches were washed out, and for several hours the whole flow went into the Main Canal. This flow was estimated at 700 second-feet. In places water a foot deep went over the lower banks of the Main Canal, but no serious washouts resulted. The damage was repaired by the 10th.

The general crop conditions are very good. Some hail fell on the night of July 4 near Osborn. The district visited by the hailstorm of June 23 is recovering nicely, and the 75 per cent loss will be cut down considerably.

Closed drain No. 32, except for back filling, was completed on the 28th. The back filler was started on the 6th and operated continuously during the

month. The drainage crew was started making repairs to the closed drains that have been stopped up.

On the 31st the thirteenth annual project picnic was held at the demonstration farm near Osborn. A baseball game, races, exhibits, band concerts, and dancing were on the program. A large crowd attended, making the picnic a big success.

On the 25th the congressional party inspected the project. Breakfast was served at the Balantine Hotel at 8 a. m., and at 9 a. m. a short automobile ride was taken over a portion of the project, returning to Ballantine at 11.30 a. m. At noon a chicken dinner was served to the visitors by the Ladies' Aid Society in the basement of the Congregational Church. At 1 p. m. the party left for Glacier National Park, stopping at 1.30 p. m. to inspect the headworks to the Huntley Main Canal.—*Wm. M. Green.*

#### MILK RIVER PROJECT, MONTANA.

Weather conditions for July were favorable for farming and construction operations. The precipitation at Malta was above normal. There were several local hailstorms, one of which did some damage to project crops between Glasgow and Nashua. The mean temperature was a little above normal, although no high maximum was reached. General crop conditions are good. The first cutting of alfalfa was completed and the second commenced. Cutting of native blue-joint hay is in progress and harvesting of dryland, but not of irrigated, small grains is under way. The range is beginning to show results of drought.

With haying in progress on the project lands and harvesting under way on the surrounding dry-land areas, the labor supply is entirely insufficient. Consequently both Government forces and contractors are working with short crews.

All canals on the Malta and Glasgow divisions were operated throughout the month for delivery of about 3,000 acre-feet of water to farms. The drag-line machine commenced cleaning the Dodson North Canal on the 26th.

Work was completed on two, continued on one, and commenced on two small earthwork contracts. On one of these latter the funds for construction are advanced by the landowners interested and on the other landowners furnish the labor, in both cases receiving credit on their water-rental charges. Drilling well for domestic water at the Paisley operation and maintenance camp by contract was commenced.

Construction by Government forces comprised one multiple bay timber check on the Dodson South Canal, and bridges, checks, turnouts, measuring devices, etc., on lateral extension work near Beaverton; turnouts and measuring devices at various other points on the project; raising canal banks at Rocky Point, mile 8, Dodson South Canal, and a small amount of work on operating roads.

On the 29th, a portion of the project was inspected by the following members of the House Committee on Appropriations: James W. Good, Joseph W. Byrnes, William R. Wood, J. M. Evans, Burton L. French, John L. Eagan, Louis C. Cramton, and J. F. Byrnes. Other official visitors included Chas. P. Williams, assistant chief engineer; J. B. Beadle, director's assistant; E. C. Leedy, immigration agent, Great Northern Railway; F. G. Hough, examiner of accounts; W. N. White and E. G. Murphy, of the United States Geological Survey; A. C. Cooley, Department of Plant Industry, United States Department of Agriculture; S. G. Dawson, irrigation engineer, reclamation service of Canada; E. V. Wilcox, representing the Country Gentleman; and W. B. Sands.—*Geo. E. Stratton.*

## ST. MARY STORAGE UNIT.

The weather during July was, on the whole, warmer than normal for this section. Most of the days were hot with frequent showers, which was favorable for crop growth and for work being carried on. Work was continued up to the 20th on rebuilding canal banks between Kennedy and Powell Creeks. On the 11th a small crew was located at Sherburne Lakes Dam to get the camp in shape and make preparations for starting construction work at this point. On the 21st a steam shovel commenced excavation on the spillway channel. The St. Mary Canal was operated during the entire month. A total of 33,814 acre-feet was diverted from St. Mary River and a total of 26,595 acre-feet was delivered to the north fork of Milk River. The gates at Sherburne Lakes Dam were closed until the 15th, when a total of 28,500 acre-feet was stored. During the latter part of the month the amount stored was reduced to 13,000 acre-feet, as the flow of the river was somewhat above normal, and it was estimated that very little stored water would be needed to answer the requirements of the Milk River project. The flow in the St. Mary River was considerably above normal during the entire month.—*R. M. Snell.*

## SUN RIVER PROJECT, MONTANA.

July weather was favorable for growing crops.

The only construction work done during the month was the opening of a camp at Pishkun Reservoir and the assembling of equipment preparatory to the construction of dikes for the storage of 3,200 acre-feet and the building of a temporary wasteway structure for discharging 1,000 second-feet into Quigley Coulee.

On the Fort Shaw division water was delivered continuously through the month. The first cutting of alfalfa yielded well and was of excellent quality. Grain crops which were properly irrigated promise excellent yields. The potato crop is in good condition. Due to cutting of hay and some showers the demand for irrigation water was relatively light until about the 20th, when it became necessary to increase the flow in the Fort Shaw Main Canal to full capacity to meet the demand. At the beginning of the month the quantity of water in Sun River at the Diversion Dam was 2,370 second-feet, which gradually grew less until it reached a discharge of 510 second-feet at the end of the month. It was necessary to use the stored waters of Willow Creek Reservoir beginning July 27.

Excepting for three days early in the month the Greenfields Canal was operated continuously. Farmers in this division who were in shape to irrigate used water with very good results. Deliveries were mostly for grain crops, although a few fields of alfalfa have been planted and are doing well. All orders for water were promptly filled. A maximum of 250 second-feet was delivered to the distribution system.

Maintenance work consisted of miscellaneous repairs to ditches and structures necessary for operation. On the Greenfields Division 80 acres of Government land were fenced for pasture at Camp 14. Rebuilding of a portion of the fence on the west side of Willow Creek Reservoir was begun.—*Geo. O. Sanford.*

## LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

The first two weeks of July were very favorable for all crops, there being occasional showers and no

*Crop report for farm units using water, Fort Shaw division, Sun River project, Montana, year of 1919.<sup>1</sup>*

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa.....	4,226	Ton.....	8,699	2.06	\$25.00	\$217,476.00	\$51.46
Alfalfa seed.....	54	Bushel.....	194	3.59	18.00	3,492.00	64.67
Barley.....	90	do.....	1,072	11.9	1.45	1,554.00	17.27
Clover hay.....	18	Ton.....	23	1.3	25.00	585.00	32.50
Clover seed.....	52	Bushel.....	310	5.95	15.00	4,640.00	89.24
Corn, Indian.....	6	do.....	134	20.5	1.80	240.00	36.97
Corn fodder.....	1	Ton.....	1	1	25.00	25.00	25.00
Flax.....	64	Bushel.....	187	2.92	4.50	842.00	13.15
Fruits, small.....	1	Pounds.....	1,080	2,160.00	.50	540.00	1,080.00
Garden.....	52	Acre.....			200.00	10,350.00	200.00
Hay <sup>2</sup> .....	571	Ton.....	438	.76	22.65	9,916.00	17.37
Oats.....	370	Bushel.....	9,957	26.91	1.10	10,953.00	29.60
Pasture.....	1,262	Acre.....			9.92	12,514.00	9.92
Potatoes.....	137	Bushel.....	19,676	142.84	1.50	29,514.00	214.26
Wheat.....	1,388	do.....	18,471	13.4	2.50	46,179.00	33.27
Cropped.....	8,292	Total and average.....				348,820.00	42.07
			Areas.		Acres.	Farms.	Per cent of project.
			Total irrigable area farms reported.....		11,550	199	82.3
			Total irrigable area farms reported, less sheep, etc.....		9,751	199	69.5
Number of acres irrigated on 196 farms.....			Total irrigated area farms reported:		8,022	192	57.2
Town sites, etc.....			Under water-right applications.....		27		.19
Miscellaneous.....			Under rental contracts (town sites, etc.)...		129	4	.81
Total irrigated.....			Under vested water rights.....				
			Total cropped area farms reported.....		8,292		59.12

<sup>1</sup> 2 units farmed "dry" reported 3 acres of hay, valued at \$75, and 20 acres of pasture, valued at \$120.

<sup>2</sup> Other than alfalfa and clover.

(Crop report for Greenfields Division on next page.)



excessive heat. The last two weeks have not been so favorable for grain crops although very few fields under irrigation were damaged by the excessive heat, and it is believed that the crop yields for the entire project, barring hailstorms and early frosts, will be the maximum since the opening of the project.

Owing to the cool weather and timely showers irrigation has been very light, only approximately 13,000 acres being irrigated during the season. No trouble was experienced with settling banks along any part of the Main Canal, and very little trouble was experienced with decayed wooden structures or breaks in any of the laterals.

Machine No 1 was engaged the entire month, working two shifts, at removal of silt, and 5,300 linear feet of Main Canal were cleaned with this machine. Machine No. 3 completed the Crane Creek Waste Ditch, and after minor repairs have been made to this machine it will be moved to the Main Canal, where it will be engaged in the removal of silt. Ten wooden turnouts were installed to replace old decayed structures. Lateral DD, which was partially destroyed by the ice and high water in the spring, was reconstructed for a distance of 800 feet. Lateral HH was cleaned and the banks raised for a distance of 600 feet, and 4,000 feet of surface drains were cleaned and repaired in the heavy cut south of Garden Coulee. Ten wooden drops were replaced with reinforced concrete type. The usual routine maintenance work of repairing minor breaks was carried on.

The irrigation commissioners for Lower Yellowstone Irrigation District No. 1 were in session from the 21st to the 23d, inclusive, in organizing, and this organization is now a going concern. These commissioners had a conference with Assistant Chief Engineer Charles P. Williams, District Counsel W. J. Egleston, and the project manager on the 22d and 23d relative to the contract to be entered into between the district and the Secretary of the Interior. From present indications Irrigation District No. 2 will be formed shortly and it is expected that both irrigation districts will enter into a joint contract with the Sec-

retary of the Interior that will place the project on a working basis.—*L. H. Mitchell.*

#### NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

The weather for July was generally fair and warm and fine for construction purposes and for all farming operations and the growing of crops. Several showers occurred, which helped the crops materially. The mean temperature was exactly the average mean temperature for the month of July. The precipitation was 1.30 inches at Lake Minatare, Nebr., and 1.06 inches at Wyncote, Wyo.

*Operation.*—The inflow at the Pathfinder Reservoir gradually decreased from 6,390 second-feet on the first to 1,440 second-feet on the last of the month. Water continued to flow over the spillway until the 15th, when the elevation had been lowered to the spillway elevation. The average outflow for the month was 5,345 second-feet.

The diversion into the Interstate Canal was increased from 1,400 second-feet on the 1st to 1,700 second-feet on the 22d and maintained at that for the remainder of the month. Water was delivered on demand until the 10th, when, on account of the increased demand, it was necessary to make deliveries on a rotation basis, with four days on and four days off, over the entire system with a head of 2 second-feet.

An average of 616 second-feet was diverted into the Fort Laramie Canal. Of this amount 300 second-feet were wasted back to the river through the sand trap at mile 0.6 and wasteway at mile 3.2 in order to carry out accumulations of silt. Small amounts were wasted at the other wasteways and a small amount was carried through to Horse Creek, at mile 67.5, in order to furnish water to private ditches diverting from that creek. Water was delivered to users under laterals to and including the Cherry Creek Lateral; 8,719 acre-feet were delivered to 115 users.

Water was delivered to users under the lateral system west of Indian Creek on the Northport unit under special contract for the season of 1920 between

#### *Crop report, Greenfields Division No. 1, Sun River project, Montana, year of 1919.*

Crop.	Area (acres).	Unit of yield	Yields.		Values.			
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre	
Alfalfa.....	143	Ton.....	38	0.26	\$25.00	\$950	\$6.64	
Barley.....	60	Bushel.....	125	2.08	1.45	181	3.02	
Clover hay.....	7	Ton.....	2	.3	25.00	50	7.14	
Corn fodder.....	1	do.....	1	2	25.00	25	50.00	
Flax.....	233	Bushel.....	271	1.16	4.50	1,219	5.23	
Garden.....	8	Acre.....			96.87	775	96.87	
Hay.....	695	Ton.....	278	.4	23.70	6,590	9.48	
Oats.....	167	Bushel.....	1,873	11.21	1.10	2,060	12.34	
Pasture.....	551	Acre.....			2.23	1,233	2.23	
Potatoes.....	19	Bushel.....	775	39.1	1.50	1,133	59.60	
Wheat.....	980	do.....	3,584	3.65	2.50	8,960	9.14	
Ensilage (mixture of various crops siloed).....	38	Ton.....	80	2.1	8.00	640	16.84	
Cropped.....	2,902	Total and average.....					23,816	8.20
Number of acres irrigated on 112 farms.....	3,308							
Miscellaneous.....	2							
Total irrigated.....	3,310	Areas.				Acres.	Farms.	Per cent of project.
		Total irrigable area farms reported.....				14,030	112	56.12
		Total irrigated area farms reported, under rental contracts.....				3,308	112	13.23
		Total cropped area farms reported.....				2,901	112	11.6

the Northport Irrigation District and the Farmers' Irrigation District.

*Maintenance.*—On the Interstate unit an average force of 25 men and 33 teams was employed on operation and maintenance work. No serious breaks occurred with the exception of one on Lateral 21A, where a large drop was washed out. Monighan drag line No. 4 continued work on strengthening and straightening the banks of the Interstate Canal between miles 29.5 and 31 in the Rawhide section; 7,036 linear feet of bank were strengthened and 19,220 cubic yards of material moved.

*Drainage.*—On the Interstate unit work was continued on the additional construction work on the Lower Nine Mile outlet drain. Three bridges were replaced and a temporary flume constructed. Drag line No. 2 continued work on the excavation of the drain, removing 4,123 cubic yards of material from 2,500 linear feet of drain. This machine also cleaned 6,099 cubic yards of material from the Pickering Drain. It was leased to Scotts Bluff County during the latter part of the month to grade about 1½ miles of county road through the seeped area.

Monighan drag line No. 3 continued work on the Dunham-Andrews open drain, working 62 shifts during the month and moving 28,490 cubic yards of material.

The Kelly Well Co., of Grand Island, Nebr., began work on their contract for the boring and casing of three drainage wells on Dutch Flats. Some surface drains were built to care for the water until the permanent relief measures can be made effective.

On the Fort Laramie unit electric drag line No. 2 continued work on the Cherry Creek Drain, operating with two shifts daily and moving 33,520 cubic yards of class 1 material. The bridges over this drain at stations 497 and 536 were completed and one farm bridge was constructed on Branch A of the drain. Protective works were constructed at the junction of the branch with the main line.

*Construction.*—Storage unit: Work was continued on the driving of the new tunnel for the north tunnel outlet works. Poor progress was made on account of the unfavorable working conditions and the diffi-

culty in obtaining the class of labor required. The north anchorage for the cableway was completed and also the foundation and the framing for the tower on the south side. The rock-crushing and concrete-mixing machinery was put in place ready to begin operation.

Fort Laramie unit: Electric drag line No. 1 finished the excavation on the lower end of the Main Springer Lateral on the 26th and moved back to begin work on the East Springer Lateral, taking out sections of classified material on the way back. The machine moved 14,750 cubic yards of material, including 3,510 cubic yards of class 2 during the month. Drag line No. 3 continued work on the excavation of the Fort Laramie Canal, operating with two shifts daily and excavating 41,092 cubic yards of material from 0.66 mile of canal. Drag line No. 4 continued work on the lower end of the Horse Creek Lateral, operating with two shifts daily until the 13th, when a third shift was added in order to complete the work and transfer the machine to the Northport unit. During the month this machine excavated 56,363 cubic yards of material, completing 3.12 miles of lateral. Drag line No. 5 was moved to the Fort Laramie Canal and began excavation east from Horse Creek on the 12th. This machine excavated 15,600 cubic yards of material, including 500 cubic yards of class 2 during the working period.

*Northport district.*—Work was continued by the electric grader outfit operated by Government forces on the construction of fills on the Northport Canal. During the month 10,170 cubic yards of material were excavated and hauled into fills. The concrete culverts at stations 273 and 330 were concreted and the forms removed. Excavation was completed for the culverts at stations 356, 438, and 445 and the floor of the culvert at station 356 concreted; 268 loads of gravel were hauled for use in construction of various canal structures.—*H. C. Stetson.*

NEWLANDS PROJECT, NEVADA.

On July 30, the project manager and director, A. P. Davis, attended a meeting in Reno called by Col.

Crop report, North Platte Canal & Colonization Co. lands, North Platte project, Nebraska-Wyoming, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	5,000	Ton.....	7,957	1.6	\$15.00	\$119,355	\$23.87
Barley.....	184	Bushel....	5,571	30	1.25	6,964	37.85
Beets, sugar, and tops.....	808	Ton.....	5,711	7	11.00	62,821	77.75
Corn.....	1,302	Bushel....	15,874	12	1.30	20,636	15.85
Oats.....	1,084	do.....	12,900	12	.80	10,320	9.52
Potatoes.....	1,059	do.....	129,510	122	1.00	129,510	122.29
Rye.....	94	do.....	535	6	1.25	669	7.11
Wheat.....	595	do.....	5,872	10	1.90	11,157	18.75
Miscellaneous.....	226	do.....				2,286	10.12
Total cropped.....	10,352		Total and average.....			363,718	35.13
			Areas.		Acres.	Farms.	Per cent of project.
Alfalfa seeding with nurse crop.....	954						
Alfalfa seeding without nurse crop.....	76						
Less duplicated areas.....	954						
Total irrigated.....	10,428		Total irrigated area farms reported.....		10,428	130	56



E. E. Winslow, Corps of Engineers, United States Army, to hear petitions of project water users to permit work to be done at Lake Tahoe outlet to enable the service to make drafts from the lake to relieve water shortage conditions on the Truckee River. Representatives of Lake Tahoe property owners, officials of the States of California and Nevada, and of other interested organizations were present. An inspection of the project was made by Col. Winslow on the 31st.

**Construction.**—Practically the only construction work in progress during the month consisted in the installation of 10 minor timber structures in the Gault Lateral to serve new lands in the Soda Lake District and the placing of 4 other minor timber structures in other laterals in the same district.

Surveys of seeped and alkali-d areas upon which temporary reductions of water-right charges have been in effect or requested, were commenced during the month.

**Settlement.**—Water-right applications on one public-land unit of 71 acres and on six tracts of private land embracing 635 acres of irrigable land were accepted during the month.

**Water supply and use.**—The low elevation of Lake Tahoe, 6,225.67 feet, on July 31, together with the obstructed condition of the channel above the outlet gates, indicated at the end of the month that it would be difficult to maintain power flows in the Truckee River in a short time unless cleaning of the channel is permitted. Steps toward this end were being taken by concerted action on the part of the water users, State officials, and the service.

The strictest economy was necessary in the use of water under the Truckee Canal. The Lahontan power plant was operated from Lahontan Reservoir. Storage in this reservoir amounted to 151,000 acre-feet at the end of the month.

**Operation and maintenance.**—Maintenance work consisted principally in the removal of water moss and vegetation from the lateral system and the cleaning of certain ditches, using drag-line excavators. Drag line No. 3 cleaned the LB Lateral over a length of 3,622 feet. The LD Lateral was cleaned over 3,441 feet of its length, using drag line No. 4. This latter machine completed the cleaning of the L drain at station 2+60.

Several minor timber structures were repaired or installed by the maintenance force.

At the end of the month 2,010 head of stock were in the Carson Lake pasture.—*John F. Richardson.*

#### CARLSBAD PROJECT, NEW MEXICO.

The demand for water during July was large and constant. It became necessary to drag the canal for moss three or four times during the month, and there was some delay in filling orders for water, due to the restricted capacity of the canal because of the growth of moss. Weeds and grasses of all kinds made unusually luxuriant growth during the past month. Three crews were kept busy cleaning laterals and mowing the canal. No maintenance work was necessary at the reservoirs.

The weather was generally fair and hot. All crops made excellent growth. The total run-off of the Pecos River for the month equaled 20,258 acre-feet. The maximum flow was 950 second-feet on July 12, which had dropped to about 280 second-feet at the end of the month.

Labor conditions were somewhat improved due to the completion of cotton chopping and the return of

considerable labor from the sheep ranches. Prices for labor remain the same as previously reported.

Three sales of farms averaging in area from 60 to 200 acres were reported. These farms were improved alfalfa farms and sold for about \$220 to \$250 per acre. The purchasers were from Arkansas and Texas.

All crops made excellent growth, due to ideal weather conditions and good water supply. An average of about 800 acre-feet of water per day was delivered to the Main Canal. With the exception of a few fields, the second crop of alfalfa hay had been harvested. About 1,500 acres were left for seed, but part of this may be cut later, depending on how seed develops. The third crop of alfalfa hay was being cut on part of the area. Considerable hay is still being stacked in the fields, due to continued shortage of cars. This shortage has somewhat improved over last month. The cotton crop is developing rapidly and is in fine condition, with the exception of a few fields which did not have proper attention.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO—TEXAS.

July weather conditions were in general most favorable for crops. A rainfall of 0.83 inch and a mean temperature of 82.6°, which is 2.1° above normal, were of considerable benefit, especially to cotton. Very little alfalfa was injured by showers.

On July 1 and 13 the maximum storage in the history of Elephant Butte Reservoir was reached at elevation 4,393.87, storage 2,147,029 acre-feet. The elevation of the water did not reach the spillway gate collars, as anticipated, lacking a 2.17-foot rise. The inflow for the month at San Marcial was 210,445 acre-feet. On July 31 the inflow had fallen to 527 second-feet.

Adequate irrigation deliveries to farms were made in July throughout the entire project, in spite of the difficulties with sand at the head of the Franklin Canal in the El Paso Valley. The flow through the Franklin Canal was greatly improved in July over June, with an increase of flow at the head of 50 per cent. This was effected by sluicing the entire canal flow at the first wasteway for about an hour each night. The delivery to farms for the month was 32,412 acre-feet, irrigating 51,329 acres.

The excellence of the crop condition is very gratifying. A marked increase of the alfalfa yield is shown in sections where drainage has been completed. In the El Paso Valley 120 cars were shipped in July at an average of \$23 per ton. Pear picking is in full swing and 60 carloads have been shipped. The first shipment of cantaloupes, 30 carloads, was made the latter part of July. About 3,000 acres are planted to cantaloupes.

Maintenance work has been confined to minor repairs and removing Johnson grass from canal banks. An experiment of pasturing a herd of about 500 sheep on the canal banks is being tried and seems very satisfactory.

Construction progressed principally on drains, lateral work being carried on only by one drag-line excavator working on the island system, excavating 31,382 cubic yards in 12,500 linear feet. The 1 T Monaghan excavator in the Rincon Valley, operating two shifts, excavated 25,000 cubic yards. Four Bucyrus 1½-yard machines and one Monaghan 2-ton excavator moved 141,000 cubic yards in the Mesilla Valley, operating a total of eight shifts, making an average of 17,600 cubic yards per shift per month. Drainage excavation in the El Paso Valley proceeded with one drag line only, operating two shifts and moving 39,166 cubic yards.

The installation of the new liners and auxiliary control on the balanced service valves at Elephant Butte was completed.

W. S. Post, consulting engineer, with headquarters in Los Angeles, visited the project the early part of July, inspecting the dam on July 7 and discussing development of power with the officials of both irrigation districts and the project manager.

Engineer Deesem, representing the Farm Loan Bank of Wichita, Kans., arrived on the project the latter part of July and inspected drainage work in the Mesilla Valley.

On July 30 a meeting was held with H. H. Brook at Las Cruces, attended by Roland Harwell, manager for the El Paso County Water Improvement District No. 1, and Maj. Richard Burges, attorney for the same district, to discuss power and other developments of the project. Gov. Evans, secretary of the Elephant Butte Irrigation District, was also present.—*L. M. Lawson.*

*Prevailing crop prices at close of July, 1920.*

Project.	Alfalfa hay, per ton.		Bar- ley, per bushel	Oats, per bushel.	Wheat, per bushel.	Potatoes, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	\$18.22	\$24-\$30	\$1.62	\$1.25	\$2.82	.....
Yuma.....	20.00	25.00	.....	.....	.....	.....
Orland.....	20.00	25.00	1.05	.....	2.10	.....
Grand Valley.....	20.00	24.00	1.90	1.25	1.75	\$1.80
Uncompahgre.....	13.00	.....	.....	1.20	2.40	3.00
Boise.....	12.00	18.00	1.00	1.20	1.90	1.80
King Hill.....	16.00	20.00	.....	.....	.....	2.10
Minidoka.....	12.00	18.00	1.37	.96	2.19	3.00
Huntley.....	15.00	18.00	.....	1.12	2.00	4.20
Milk River.....	16.00	20.00	.72	.62	1.98	5.60
Sun River.....	14.00	20.00	.80	.70	1.89	4.20
Lower Yellowstone.....	20.00	.....	1.40	1.10	2.00	3.00
North Platte.....	.....	.....	.....	.....	.....	.....
Newlands.....	20.00	25.00	.....	.....	.....	4.80
Carlsbad.....	.....	18.00	.....	.....	.....	.....
Rio Grande.....	.....	.....	.....	.....	.....	.....
North Dakota pump- ing.....	.....	.....	.....	.....	.....	.....
Umatilla.....	.....	20.00	.....	.....	.....	4.80
Klamath.....	20.00	25.00	2.32	1.15	2.10	.....
Belle Fourche.....	.....	.....	.....	.....	.....	.....
Strawberry Valley.....	18.00	22.00	1.37	1.07	2.10	1.50
Okanogan.....	30.00	.....	.....	.....	.....	6.66
Yakima:	.....	.....	.....	.....	.....	.....
Sunnyside unit.....	.....	21.00	.....	.....	.....	2.10
Tiefon unit.....	.....	21.00	.....	.....	.....	2.10
Shoshone.....	12.00	.....	.....	1.65	1.40	2.40
Blackfoot.....	.....	.....	.70	.61	1.95	.....
Flathead.....	20.00	.....	.....	.....	.....	3.92
Fort Peck.....	20.00	25.00	.....	1.12	2.10	6.00
Riverton.....	.....	.....	.....	.....	.....	.....

**NORTH DAKOTA PUMPING PROJECT.**

Weather conditions were unusual, in that the month of July was hot and dry throughout, except for one rain of about  $\frac{1}{2}$  inch. Early crops of grain were not much affected, but the late crops began to burn toward the end of the month. Fortunately, the prevailing wind direction was north, for with normal south winds accompanying the other conditions crops would have been lost. Precipitation was 0.96 inch, which was 1.07 inches less than normal and makes a deficiency of 0.26 inch for the year.

Labor conditions grew worse and were the most difficult ever experienced in this section. These difficulties were aggravated at the end of the month by the call for men for the early harvest.

The demand for irrigation water was more regular and the load more evenly distributed than in any previous irrigation season.

The power plant was operated for the commercial power contract; 83,158 kw-h. of energy were delivered to the city of Williston, which was 12,173 kw-h. more than during the same month of last year.

Two thousand five hundred and seventy tons of coal were mined.—*Wm. S. Arthur.*

**UMATILLA PROJECT, OREGON.**

Excellent growing weather prevailed during July. The mean temperature was  $2\frac{1}{2}$  above the normal for this month for the previous 13 years. There was no rainfall.

*Farming operations.*—At the close of the month the second cutting of alfalfa was being harvested. During the month 68 cars of baled and chopped alfalfa hay were shipped. Less-than-carload shipments of potatoes and apples totaled approximately 7,300 and 10,000 pounds, respectively. This does not include express shipments, a record of which could not be obtained, but which were heavy. The most favorable feature of the crop situation was the uniformly heavy yield of the second cutting of alfalfa, and the most discouraging feature was the uncertain market and lack of demand for alfalfa hay.

*Operation and maintenance.*—The feed canal was not operated during the month. At the close of the month the total storage remaining in Cold Springs Reservoir was 22,450 acre-feet. Heavy diversions by Canal A were necessary throughout the month to meet the demand for water. From 236 to 290 second-feet were diverted from Cold Springs Reservoir throughout the month. The Maxwell Canal held up well, from 25 to 50 second-feet being diverted from the river continuously. Diversions by the main canal for the west extension were continuous and somewhat heavier than during the previous year. Approximately 110 second-feet were diverted throughout the month. This supply was adequate in view of the success attending the installation of rotations. Some difficulty was had at times in supplying new seedlings with the frequent applications they require. From two to three small crews were employed throughout the month on general maintenance work. The chief operations were concerned with mowing ditch banks, minor repairs, and mowing.

*Construction.*—After being suspended for about two months work was resumed on the improvement of Canal A. The work now under way consists of placing additional concrete on top of the old lining now in place on the lower side and near the head of the canal to provide the necessary freeboard. This work will be carried on until such time as water is turned out of the canal, when the scene of operations will be changed to station 212 and full lining placed continuously down the canal as long as weather conditions and funds will permit. The work this month consisted principally of preparing the embankment, building and erecting movable panel forms, and securing and delivering aggregate for concrete, only a small amount of concrete being placed.

*Visitors.*—W. E. Buell, of Seattle, Wash., an engineer for the Puget Sound Bridge & Dredging Co., visited the project on the 8th. He was interested, on behalf of the Western Lands & Irrigation Co., in the storage investigations on McKay Creek. On July 16 the House Appropriations Committee visited the project, inspecting constructed works and viewing reclamation development.—*Maurice D. Scroggs.*



## KLAMATH PROJECT, OREGON-CALIFORNIA.

The mean temperature for July was about normal and generally favorable for the growing of crops. The cutting of the first crop of alfalfa hay was begun on July 5 and continued throughout the month. The first cutting of alfalfa promises well but is much later than usual. Grain crops throughout the project are in good condition. The grain crops on the Tule Lake leased lands are exceptionally good, particularly on the lots close to the margin of the lake.

The demand for water was quite heavy during the first few days in July, after which the demand decreased. After the 20th the demand for water again increased, and it is probable that it will be continued during the first two weeks in August. During the month 23,300 acre-feet of water were diverted, of which about one-half was delivered to the farms.

Much difficulty has been experienced with algae in all of the project canals and some of the larger laterals. Four crews were busy during the entire month dragging the canals with heavy chains. During the latter part of July almost continuous dragging has been necessary to provide capacity for the heavy demand for water which is anticipated during the first half of August.

The Monighan drag line excavator was occupied practically all month moving to the Pettit Drain; at the end of the month about 600 feet of ditch had been completed.

One survey party, consisting of an assistant engineer and three men, was engaged on Tule Lake topography and on miscellaneous work.

The project was inspected on July 7 by the following members of Congress: Messrs. James W. Good, Joseph W. Byrns, J. M. Evans, Benton L. French, W. R. Wood, Louis C. Crampton, J. J. Eagan, N. J. Sinnott, and Charles E. Timberlake. The party was accompanied by A. P. Davis, director, J. B. Beadle, director's assistant, E. O. McCormick, vice president of the Southern Pacific Railroad, and Stephen T. Mather, Director of the National Park Service. The committee arrived at Klamath Falls at about 7 a. m., July 7, and were taken on an automobile trip over the project to Tule Lake lands and left at about 2 p. m. for Crater Lake National Park.

R. F. Walter, assistant chief engineer, and H. L. Holgate, district counsel, visited the project from July 8 to 13, in connection with matters pertaining to Lower Klamath Lake marsh lands.

Niconor Cortez and Angel Martinez, of the bureau of public works of Manila, P. I., were on the project from the 8th to the 20th making a study of irrigation methods.—*Herbert D. Newell.*

## BELLE FOURCHE PROJECT, SOUTH DAKOTA.

The seasonal wet weather continued until July 7 when it turned hot and dry with the exception of a good shower on the 24th. No hailstorms occurred during the months. Roads were in good condition.

The first water for irrigation was turned into the canals on July 10. The demand was light for several days, but toward the latter part of the month was quite pronounced. About 15,000 acre-feet of water were diverted for irrigation, of which 8,500 acre-feet were delivered to farms. Considerable difficulty was experienced in making deliveries through small canals on account of the rank weed growth and the accumulations of silt, washed in by the heavy rains earlier in the season. A delay of about a week in making deliveries through the North Canal was caused by leak-

age through one of the large concrete culverts under the canal above Indian Creek flume. The culvert has been in bad shape for some time, but was patched up for this year's run with a view to replacing it in toto this fall. In order, however, to make quick repair it was sealed with concrete on both ends. A large program of repair and ditch cleaning will be necessary this fall, in order to put the system in proper condition. Parties of from 6 to 10 men each have been working out from each of the three operation and maintenance stations. The work has been mainly small repairs to laterals and minor structures and the cutting of weeds so as to get the water through. One washout occurred on the Johnson Lateral that required four days to fix. The Townsite Lateral siphon was completed to the east side of main street or about two-thirds of its length. At that point connection was made with the old wooden pipe for the season's operation. The work on this siphon replacement was very slow and expensive, due mainly to extremely unfavorable weather conditions. The cost has been about 50 per cent more than was estimated for the completed job. Preparation will be made to complete the work as soon as water is out of the canals.

J. L. Burkholder, drainage engineer for the service, spent four days on the project making inspection of seepage conditions.—*B. E. Hayden.*

## STRAWBERRY VALLEY PROJECT, UTAH.

July was generally fair and warm, with local showers during the latter part of the month. At the East Portal of Strawberry Tunnel the precipitation was 0.66 inch and at Provo 0.49 inch.

*Farming operations.*—The continued warm weather throughout the month assisted the growth of all crops and increased the demand for irrigation water, which reached a maximum on the 19th. The harvesting of grain and the cutting of the second crop of alfalfa have begun.

The present forecast of crops is: Cherries, peaches, and apricots, about 50 per cent normal; grains, above normal; alfalfa and forage crops, normal; sugar beets, above normal. In fact, the general crop outlook is excellent, with high prices prevailing.

*Hydrographic data.*—On the last day of the month the High Line Canal was carrying 132 second-feet and during the month a total of 11,943 acre-feet were delivered to the High Line unit for irrigation purposes. On the last day of the month the Spanish Fork River was flowing 123 second-feet, and during the month 5,791 acre-feet of water was delivered to the five Spanish Fork canal companies for distribution to the Strawberry water users. The Mapleton and Springville Irrigation Districts called for 2,545 acre-feet during the month. The total amount of water delivered during the month to the various units under the project was 20,279 acre-feet.

*Labor conditions.*—No scarcity existed in any particular class of labor and no difficulty was encountered in obtaining ample labor whenever needed.

*Operation and maintenance, storage system.*—The usual operation and maintenance work was done in connection with Indian Creek and Trail Hollow feeder canals. A foreman and seven laborers opened camp at West Portal on July 11 to begin work of opening up a quarry and constructing a road for installation of crushing machinery. The crusher and revolving screen were repaired and hauled to West Portal, and on the last day of the month the installation of the crushing machinery was commenced. About 200 cubic yards of material had been quarried up to the end of the month.

**Operation and maintenance, power system.**—The power plant was operated without interruption and power furnished to the towns of Spanish Fork, Salem, Payson, and Springville.

The alterations and repairs to No. 2 generator unit were completed on July 12 and the new unit put in on the line. Alterations and repairs to No. 1 generator unit were commenced and on the last day of the month were about 20 per cent completed. The telephone line between Diamond Switch and West Portal was re-located at several places and new poles put in where necessary. At the end of the month the repairs were about 75 per cent completed.

**Settlement.**—During the month 12 water applications were received and accepted, 11 of which were new applications and 1 supplemental.

**General.**—Negotiations with the landowners under the proposed Santaquin pumping plant were continued and an irrigation district may yet be formed for the purchase of about 1,500 acre-feet of water from the project.

Final confirmatory decree was made in the district court on July 6 relative to the contract between the United States and Springville Irrigation District for the purchase of 2,000 acre-feet of water—W. L. Whittemore.

#### Project weather during July, 1920.

Project.	Station.	Temperature, °F.			Pre- cipitation (inch- es).
		Maxi- mum.	Mini- mum.	Mean.	
Salt River.....	Phoenix, Ariz.....	114	65	90.7	0.25
Yuma.....	Yuma, Ariz.....	116	68	93	T.
Orland.....	Orland, Calif.....	107	53	77.8	.05
Grand Valley.....	Grand Junction, Colo.....	99	55	78	.17
Uncompahgre.....	Montrose, Colo.....	96	48	71.5	.17
Boise.....	Boise, Idaho.....	99	52	72.8	.03
King Hill.....	Glenns Ferry, Idaho.....	111	46	81.1	.....
Minidoka.....	Burley, Idaho.....	98	42	72.2	.04
Huntley.....	Ballantine.....	99	44	72.6	.88
Milk River.....	Malta, Mont.....	97	48	73	2.06
St. Mary storage.....	Near Babb, Mont.....	89	48	70	2.14
Sun River.....	Fort Shaw, Mont.....	93	40	68.5	1.28
Lower Yellowstone.....	Savage, Mont.....	101	47	74	2.05
North Platte.....	Wyncote, Wyo.....	100	38	69.6	1.06
Newlands.....	Fallon, Nev.....	99	44	67.1	.....
Carlsbad.....	Carlsbad, N. Mex.....	106	61	.....	1.29
Rio Grande.....	El Paso, Tex.....	100	58	82.6	.84
North Dakota pump- ing.....	Williston, N. Dak.....	98	47	71	.96
Umatilla.....	Hermiston, Oreg.....	101	44	73.7	.08
Klamath.....	Klamath Falls, Oreg.....	93	43	65.9	.65
Belle Fourche.....	Orman, S. Dak.....	97	53	73.9	1.92
Strawberry Valley.....	Provo, Utah.....	99	45	71.5	.49
Okanogan.....	Omak, Wash.....	108	50	77.4	1.15
Yakima:					
Sunnyside unit.....	Sunnyside, Wash.....	103	45	73.7	.18
Tieton unit.....	Cowiche, Wash.....	96	38	71.4	.24
Shoshone.....	Powell, Wyo.....	98	43	69.54	.30
Indian projects:					
Blackfeet.....	Browning, Mont.....	90	33	63.5	1.71
Flathead.....	St. Ignatius, Mont.....	97	41	69	.82
Fort Peck.....	Poplar, Mont.....	103	48	74.6	.17
Riverton.....	Pavillion, Wyo.....	100	52	74.3	.95

#### OKANOGAN PROJECT, WASHINGTON.

For the greater part of July the weather remained very warm, with more wind than usual during that month. For a short period during the middle of the month rains occurred which helped considerably. The second general irrigation for the project was completed about the middle of July and a short one will be started shortly after the last of the month, with water being delivered to vested water-right lands

every other week. Nearly all of the emergency work has been completed with the exception of the engine at Riverside, installation of a pump and engine at the diversion well, installation of a 25-horsepower engine and pump at the lower end of Salmon Lake, Conconully, and completion of the setting up of the Duck Lake engine at the upper end of Salmon Lake. All of the emergency plants completed to date have been operated during the month when needed, and with the exception of the engine at the generating plant at Omak have worked very well. This engine has given considerable trouble, due, it is believed, to overload.—*Calvin Casteel.*

#### SALMON LAKE DAM.

Good rains fell on July 12 and 14; otherwise the weather during July was dry and hot. In consequence of the unusually dry spring the local streams reached a very low stage.

Unemployed labor exists in the near-by cities, but it was impossible to secure and maintain full crews.

Construction forces at Conconully erected 19,000 feet of lumber, in 735 linear feet of flume in the canal to the outlet through the Salmon Lake Dam from the pumping plant on the upper portion of Salmon Lake. The Salmon Lake pumping plant was erected at the new location on the upper portion of the lake and during the last half of the month delivered 218 acre-feet of water into the Conconully Reservoir. The 125-horsepower gas engine from the Duck Lake plant has been erected at Salmon Lake and will be placed in operation early in August.

At Conconully Dam a trench was dug by hand the full length of the crest of the dam preparatory to placing a concrete parapet wall.

On Salmon Lake road the steam shovel was laid up part of the month while rock drilling was in progress. A double shift was worked on rock drilling most of the month. A total of 4,428 cubic yards of solid rock was excavated.

On Salmon Lake Dam a team crew placed 546 cubic yards of gravel riprap and 5,719 cubic yards of earth embankment.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for July was about normal. Precipitation consisted of a severe storm on the 12th, resulting in a cloudburst.

**Operation and maintenance.**—Sunnyside unit: The diversion into Sunnyside Canal increased gradually from 1,200 second-feet to 1,250 second-feet, the average for the month being approximately 1,100 second-feet. Operation was interrupted on July 12 by a break in the Main Canal (the first serious break since 1912) caused by a cloudburst which occurred about 4 p. m. on the Rattlesnake Ridge in the region north of mile 27.50. The break was repaired as rapidly as possible by the use of day and night crews, and partial water service was given on July 17, full delivery being resumed on July 22 to all of the project. Maintenance work, in addition to the repair of the Main Canal break, consisted of removal of weeds from branch canals and laterals, repair of minor structures in the distribution system, and additional protective work on the Main Canal banks between miles 26 and 30. During the period when water was not available for operation on account of the canal break the several pumping plants were gone over and necessary repairs and adjustments made, full service being restored at all the plants by July 19. Water deliveries to the irrigation districts averaged as follows:



	Second-feet.
Outlook Irrigation District .....	46
Snipes Mountain Irrigation District .....	18
Grandview Irrigation District .....	36
Prosser Irrigation District .....	20.5
Sunnyside Irrigation District .....	50

Tieton unit: The flow in the Tieton Main Canal was maintained practically throughout the month at 311 second-feet, the present maximum carrying capacity, the entire diversion being supplied from the river run-off up to the 22d, when storage water was released from Bumping Lake Reservoir. Water service was in general satisfactory throughout the project, with the exception of about 10 days during the early part of the month, when, owing to heavy demand, service was irregular, especially on Ahtanum Ridge. Maintenance crews were occupied in removing weeds and silt from the canals, repairing and renewing measuring boxes, and painting patrol houses. A heavy rainstorm on the 13th, accompanied by hail over a limited area near Tieton, caused some damage to potatoes, corn, and fruit.

*Investigation and surveys for new units.*—No field work in progress. Work in the office consisted of preparation of sketch plans of structures and estimates for the Moxee unit. Contract with the Yakima Irrigation District to cover this work was executed by the assistant director on July 1. Similar contract with the Yakima-Benton Irrigation District for continuation of surveys on the Roza unit was executed by the district on July 6 and has been forwarded to Washington for further action.

*Cooperative investigations, Pasco project.*—Field investigations on soil survey and determination of water

duty, which were undertaken on March 8, under cooperative agreement with the State of Washington, were continued, the work for July consisting of water measurements on lands now irrigated and inspection of delivery weirs. Soil survey was begun on July 19, with the assistance of Prof. P. P. Peterson, of the State College of Washington.

*Storage unit.*—The force on the clearing work at Lake Keechelus was increased from 54 men at the beginning of the month to 109 at the close of the month; 18 teams were employed in piling logs, with the assistance of a small donkey engine. Some betterment work on the spillway channel of Keechelus Reservoir was in progress, a Bagley bucket being used.

At Rimrock the camp was in charge of three men, one of these being on duty as night watchman. The cottages were rented throughout the month to tourists. At the end of the month a crew of 8 teams and 10 men was at work harvesting the hay crop at the farm, which will amount to approximately 300 tons of No. 1 timothy. The Northern Pacific Lumber Co. operated the sawmill under their contract of May 3, 1920.

*Visitors.*—On July 14 and 15 members of the House Appropriations Committee, accompanied by Director A. P. Davis and his assistant, J. B. Beadle, visited the project. They arrived in the afternoon of the 14th and were taken over the Tieton unit and through the Moxee Valley. In the evening they were entertained at a banquet by the Yakima Commercial Club. The following day the party proceeded by special O-W train to the Sunnyside unit, stopping at Zillah for luncheon. The afternoon was spent on the Sunnyside unit, the evening program consisting of a banquet at Sunnyside by the Sunnyside Commercial Club.

*Crop report, Garland division, Shoshone project, Wyoming, year of 1919.*

Crop.	Area (acres).	Unit of yield.	Yields.			Values.	
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	14,239	Ton.....	38,299	2.69	\$20.00	\$765,970	\$53.80
Alfalfa seed.....	117	BusheL.....	161	1.38	13.00	2,093	17.89
Apples.....	5	Pound.....	9,100	1,654.50	.05	455	82.74
Barley.....	115	BusheL.....	3,914	34.03	1.75	6,850	59.56
Beans.....	3	do.....	25	8.91	7.00	171	62.37
Beets, sugar.....	540	Ton.....	6,277	11.63	10.00	62,770	116.31
Clover hay.....	40	do.....	72	1.84	20.00	1,450	36.71
Clover seed.....	672	BusheL.....	2,559	3.81	12.00	30,708	45.73
Corn, Indian.....	29	do.....	655	22.39	1.50	92	33.59
Corn, fodder.....	15	Ton.....	74	4.93	15.00	1,110	74.00
Fruits, small.....	1	Pound.....	1,967	1,356.33	.15	295	203.45
Garden.....	249					23,975	96.31
Hay.....	167	Ton.....	150	.90	15.00	2,250	13.45
Oats.....	3,110	BusheL.....	83,080	26.72	.90	74,772	24.05
Onions.....	1	do.....	150	150.00	2.40	360	360.00
Pasture.....	2,453					72,880	29.71
Potatoes.....	1,316	BusheL.....	149,656	113.69	1.20	179,587	136.44
Wheat.....	11,179	do.....	223,891	20.03	2.15	481,366	43.06
Sunflowers.....	8	Ton.....	120	15.00	5.00	600	75.00
Less duplicated areas.....	76						
Total cropped.....	34,183		Total and average.....			1,708,644	49.98
			Areas.	Acres.	Farms.	Per cent of project.	
Nonbearing orchard.....	39		Total irrigable area farms reported.....	40,435	631	29.60	
Young alfalfa.....	1,057		Total irrigated area farms reported.....	34,697	631	25.40	
Ground fall plowed.....	232		Under water-right applications.....	33,916	625	24.80	
Miscellaneous.....	164		Under rental contracts.....	65	1	.....	
Less duplicated areas.....	978		Leased land.....	110	1	.....	
			Lands with water right in litigation.....	445	4	.....	
Total irrigated.....	34,697		Total cropped area farms reported.....	34,183	631	25.05	

On July 24 Hon. John Barton Payne, Secretary of the Interior, and Hon. Josephus Daniels, Secretary of the Navy, stopped at Yakima, en route from a trip to Alaska. They were taken for a drive over the Tieton unit in the morning, entertained at luncheon at Toppenish, on the Yakima Indian Reservation, and for a drive over the Sunnyside project in the afternoon, the day's program closing with a banquet by the Yakima Commercial Club at Yakima in the evening.—*J. L. Lytel.*

#### SHOSHONE PROJECT, WYOMING.

July was normal, but with no continued exceedingly hot weather. As a result no high flood occurred on the Shoshone River. The discharge thereof was at a maximum on July 4 and 5.

**Water supply.**—Shoshone Reservoir has been above the spillway elevation all month, with a maximum depth of 4 feet on the 4th and 5th and with a minimum of 1.6 feet at the end of the month. Stream flow has been sufficient for all water users. It has not been necessary to operate the balanced valves at Shoshone Dam.

**Operation and maintenance.**—The canal system was operated the entire month; 39,132 acre-feet were delivered to 918 water users in 1,790 deliveries to irrigate about 46,000 acres of land. The total amount diverted from the Shoshone River was 46,800 acre-feet at a maximum rate of 940 second-feet. Peak load was continuous from the 17th to the end of the month. Maintenance work consisted mainly of miscellaneous work on minor structures and riprapping and channel protection on various canals. A break in the pipe of a lateral turnout near the head necessitated turning water out of the Main Canal for about 12 hours on July 15, but no serious damage resulted. The Monighan drag line on the Frannie

Canal cleaned 0.7 mile from the 1st to the 9th, when the most critical section in the ditch was passed and the machine moved to drainage work on the Garland North Unit. Some trouble has been experienced in the operation of two principal laterals, due to moss growth.

**Drainage.**—On the Garland Division the Austin trencher excavated closed drain 26-2, 1,900 feet in length, and was put into the shop on the 19th for minor repairs. The Lidgerwood drag line continued excavation on open drain X, excavating 2,900 feet thereof. The Monighan drag line moved from Frannie Canal, cleaning to Drain 28 July 10 and 11, and began digging on that drain on the 12th, excavating 1,000 feet thereof. On the Frannie Division the Bucyrus drag line continued excavation of the Howell Drain the entire month, excavating 1,100 linear feet. One survey crew was in the field the entire month on drainage investigations.

**Field and office engineering.**—With the exception of the crew above mentioned, the only field work carried on was by a survey crew on the Frannie Division, which in addition to miscellaneous work began cross-sectioning of the lateral system of the third unit in that division. Office work was confined to routine.

**Settlement.**—There was no activity in settlement work, either in the matter of town sites or irrigated homesteads.

**Construction.**—On the Frannie Division Government forces worked on a wasteway for the D-23 system of the second unit, installation of farm weirs on the same unit, on Sage Creek flume, and farm and lateral turnouts from the Frannie Canal for the third unit, and on the system for the recapture of waste water from Sage Creek and diversions into Deaver Canal. Work could not be prosecuted with the force desired because of labor shortage. On the 26th adver-

#### Crop report, Frannie division, Shoshone project, Wyoming, year of 1919.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay.....	1,035	Ton.....	2,139	2.07	\$20.00	\$42,780	\$41.32
Alfalfa seed.....	41	Bushel....	45	1.02	13.00	585	13.29
Barley.....	15	do.....	230	15.32	1.75	403	26.81
Beans.....	21	do.....	304	14.14	7.00	2,128	98.98
Beets, sugar.....	14	Ton.....	66	1.66	10.00	660	46.32
Clover hay.....	32	do.....	30	.94	20.00	600	18.75
Clover seed.....	77	Bushel....	320	4.16	12.00	3,840	49.87
Corn, Indian.....	27	do.....	470	17.74	1.50	705	26.60
Corn, fodder.....	24	Ton.....	27	1.12	15.00	405	16.87
Garden.....	38	do.....				3,211	84.18
Hay.....	215	Ton.....	178	.83	15.00	2,670	12.42
Oats.....	1,184	Bushel....	19,849	16.77	.90	17,864	15.09
Pasture.....	324	do.....				2,783	8.57
Potatoes.....	132	Bushel....	1,917	14.57	1.20	2,300	17.49
Rye.....	3	do.....			1.75		
Wheat.....	3,673	do.....	45,302	12.32	2.15	97,399	26.49
Less duplicated areas.....	25						
Total cropped.....	6,833		Total and average.....			178,333	26.10
Nonbearing orchard.....	8						
Young alfalfa.....	1,332						
Ground fall plowed.....	160						
Miscellaneous.....	371						
Less duplicated areas.....	1,760						
Total irrigated.....	6,944						
			Areas.		Acres.	Farms.	Per cent of project.
			Total irrigable area farms reported.....		11,048	172	8.10
			Total irrigated area farms reported.....		6,943	172	5.08
			Under water-right applications.....		6,886	171	8.05
			Under rental contracts.....		57	1	.04
			Total cropped area farms reported.....		6,832	172	5.00



tisement was issued for the construction of the lateral system of the third unit of the Frannie Division. About 42,000 cubic yards of excavation are involved, and the work is divided into six schedules to permit of small team outfits bidding thereon. The proposals will be opened August 7.

*Visitors.*—The project was inspected by several members of the Committees on Appropriations and the Public Lands of the House of Representatives on the 23d and 24th. The Secretary of the Interior also made a brief visit to the project on the 30th.—*J. R. Jakisch.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

The weather during July was, on the whole, considerably warmer than usual for this section. Most of the days during the month were hot, with scarcely any wind, but with frequent showers at night. This condition was very favorable for crop growth and the indications are very favorable for satisfactory crop results. Four systems on the project were operated during the month for irrigation, a total of 5,334 acres being irrigated and 4,911 acre-feet being delivered to farms. On the 2d a break occurred in Two Medicine Canal, making it necessary to shut out the water for 5 days at a time when water was needed the most, but on account of showers at this period the results to crops in consequence of this break are not considered serious. The only construction work was the enlargement of the Two Medicine Canal with a drag-line excavator.—*R. M. Snell.*

##### FLATHEAD PROJECT, MONTANA.

McDonald Lake spillway was completed and grading the dam progressed during July. Excavation of Pablo Feeder Canal was continued and 113 minor structures were placed on the Mission A lateral system. All construction was done by Government forces.

The number of acres irrigated was about 16,000, with about 20,500 acre-feet delivered. Two breaks occurred in Lateral B and one in Lateral C of the Camas Division. The serious breaks occurred in the Polson A Lateral.

The condition of the crops is not up to the standard of the early season, but live stock is in good condition.—*E. A. Moritz.*

##### FORT PECK PROJECT, MONTANA.

July was dry and hot.

Construction work has been confined to work on the Big Muddy unit on the construction of the siphon at station 178 and the construction of canal and farm turnouts and checks; 518 feet of lock-joint pipe were manufactured and 24 intake units; 2 canal turnouts, 12 farm turnouts, and 5 checks were completed.

One field party was employed on land classification for the preparation of farm-unit plats.

Water was delivered under the Big Porcupine, Little Porcupine, and Poplar River units. Under the latter unit only a small amount has been available.

The second cutting of alfalfa is being harvested and some of the earlier grain is ready. Gardens are in excellent condition.—*R. M. Conner.*

##### RIVERTON PROJECT, WYOMING.

The temperature during July was somewhat higher than normal. The precipitation was confined to local showers. The roads were for the most part in good condition for hauling.

Drag line No. 1 was operated, one shift from July 20 to 26 and two shifts from July 27 to 31, the remainder of the month being spent on repairs. Drag line No. 2 was operated, one shift throughout the month. The total amount of excavation moved during July was 13,298 cubic yards, of which 2,425 cubic yards were excavated from outside the canal prism. Of the total excavation, 11,748 cubic yards were class 1 material, being heavy gravel, and 1,550 cubic yards class 2 material, being a moderately hard shale, which was handled without blasting.

Construction of a telephone line from Riverton to the Diversion Dam was begun on July 21. One truck continued hauling and distributing poles throughout the month.

Construction was begun on a four-room cottage at Riverton and on a gatekeeper's cottage at the Diversion Dam.

Preparations were made for handling a larger force at camp and a bridge was built across Dry Creek to facilitate transportation between camp and the drag lines.—*H. D. Comstock.*

#### GENERAL OFFICES.

*Washington office.*—During July the office was in charge of Morris Bien as acting director. Director Davis was in the West, spending a portion of his time with the congressional committee of inspection, which visited a number of the projects, attending conferences, and arranging for the meeting at San Diego, Calif., on the Imperial Valley and the All-American Canal.

Chief Counsel Hamele left on August 8 upon an official trip to the following offices and projects: Huntley project, Shoshone project, office of district counsel, Helena, Sun River project, Minidoka project, King Hill project, Boise project, Umatilla project, Yakima project, office of district counsel, Portland, Klamath project, Orland project, office of district counsel, San Francisco, Lake Tahoe and Newlands project, Strawberry Valley project, Grand Valley project, Uncompahgre project, Denver office, North Platte project, and Belle Fourche project.

Material for the nineteenth annual report began to come in during the latter part of the month and is being edited and assembled for printing.

*Denver office.*—The chief engineer returned to Denver from Los Angeles on July 5. On July 12 he left to again join the congressional party and with them visited the Boise, Minidoka, American Falls, Shoshone, and Huntley projects, returning on the 27th. On July 30 he left for San Diego to attend the conference relative to the All-American Canal. Asst. Chief Engineer R. F. Walter left on July 4 and visited the Klamath and Castle Peak projects, returning on the 22d. Asst. Chief Engineer Charles P. Williams left on July 19, visiting the Lower Yellowstone, North Dakota pumping, Sun River, St. Mary storage, and Milk River projects by the end of the month. The only official visitor was Mr. Ferd Bonstedt.—*R. F. Walter.*

Hogs have been reduced relatively about 5 per cent during the first four months of this year on the farms of the United States, as compared with the trend during the first four months of 1919, and there has been a relative reduction of 6 per cent in cattle during these four months of this year in comparison with the same time last year.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

Hon. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSANG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamel, chief counsel; J. B. Beadle, director's assistant; C. J. Blanchard, statistician; Hugh A. Brown, editor; E. C. Bebb, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk; F. G. Hough, Yakima, Wash., and C. E. Piatt, Denver, Colo., examiners of accounts.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD LEGAL OFFICES.

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**Denver, Colo.**—Law section office of chief engineer; E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfoot, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr, district counsel, 349 Pacific Building. Projects: Salt River, Yuma, Orland, and Newlands.

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**Minidoka Project.**—Barry Biddle, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, acting chief clerk; Miss A. J. Larson, fiscal agent.

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**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.** Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; L. H. Kline, fiscal agent.

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**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

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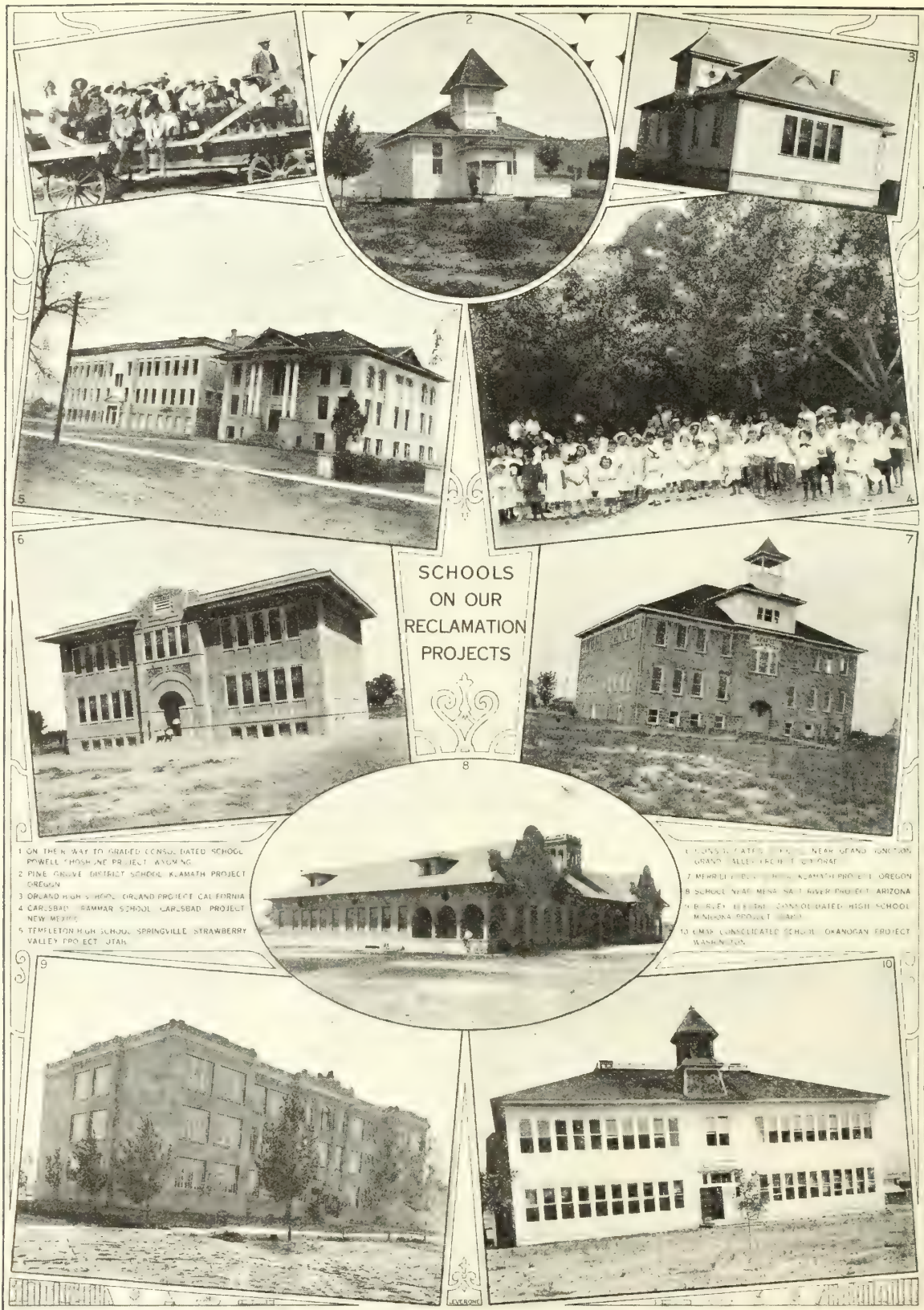
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1 ON THE WAY TO GRADED CONSOLIDATED SCHOOL  
POWELL CREEK PROJECT, ARIZONA  
2 PINE GROVE DISTRICT SCHOOL, KAMATH PROJECT,  
OREGON  
3 ORLAND HIGH SCHOOL, ORLAND PROJECT, CALIFORNIA  
4 CARLSBAD HAMMAR SCHOOL, CARLSBAD PROJECT,  
NEW MEXICO  
5 TEMPLETON HIGH SCHOOL, SPRINGVILLE STRAWBERRY  
VALLEY PROJECT, UTAH

6 JONES CATERPILLAR, NEAR GRAND JUNCTION,  
GRAND ALLIANCE PROJECT, OREGON  
7 MERRILL C. D. L. HIGH SCHOOL, KAMATH PROJECT, OREGON  
8 SCHOOL NEAR MESA, NAUVOO PROJECT, ARIZONA  
9 BULLY BE THE CONSOLIDATED HIGH SCHOOL,  
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10 EMERSON CONSOLIDATED SCHOOL, OKANOGAN PROJECT,  
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SCHOOLS  
ON OUR  
RECLAMATION  
PROJECTS



# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURE INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

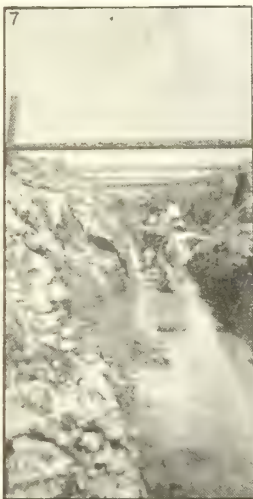
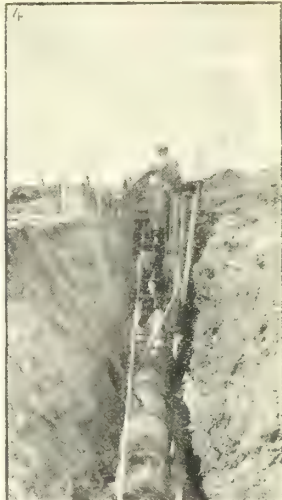
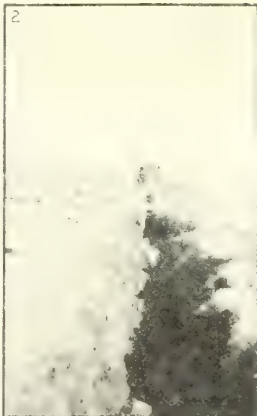
VOLUME 11, No. 10

PRICE (NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

OCTOBER, 1920







- 1 SLIDING MATERIAL REQUIRED A LARGE AMOUNT OF HAND WORK.
- 2 TRENCH IN BAD MATERIAL AFTER SHEATHING HAS BEEN PULLED.
- 3 TILE LAID THREE TIMES BEFORE BANKS BECAME STABLE.
- 4 DRAIN TILE IN PLACE
- 5 PLACING LAGGING IN BAD MATERIAL WHERE LIGHT SHEATHING WAS NECESSARY.
- 6 REMAINS OF CRIBBING IN COMPLETED DITCH.
- 7 NORMAL DRAGLINE TRENCH FOR TILE DRAIN CONSTRUCTION.
- 8 AUSTIN TRENCHER DIGGING DRAIN.
- 9 HANDLING PLATFORMS FOR MOVING DRAGLINE OVER SOFT PLACES.
- 10 CONTINUOUS LAGGING THROUGH BAD MATERIAL.

## MAINTENANCE OF CLOSED DRAINS.

By C. M. Jump, Superintendent of Irrigation, United States Reclamation Service,  
Shoshone Project, Wyoming.

**W**ORK on the construction of open drains on the Shoshone project was begun on November 27, 1911, under contract. Work on tile drains by Government forces was begun during the fall of 1912. By the end of the year 1919, 19.68 miles of open subsoil drains and 85.85 miles of tile drains had been constructed.

The area in which drains have been constructed has a porous gravel subsoil, and the drains for the most part are constructed in this material. In some cases the top of the gravel is below the grade of the tile, and the drain has been constructed in sand or sandy soil. Only one closed drain (Drain V) has no gravel either around the tile or in the subgrade. About 8 miles of drain have been constructed in material other than gravel. This material varies from a quicksand to a heavy clay.

It has been the practice on this project wherever the grade of the drain is not in gravel to use a tile cradle. This cradle is made of 2 by 4 inch lumber beveled on the edges and spaced so as to bring the support on the tile at the quarter points at an angle of 45° to the horizontal and vertical axes of the tile. Some of these cradles have been used as short as 6 feet in length, but at present no length shorter than 12 feet is used. In exceptional cases where the subgrade has been a quicksand, piling has been driven and the tile cradles hung in yokes on these piling. The material used for this piling has usually been broken or split lagging boards. In one case only, on Drain N, has gravel been hauled and placed around the tile. This was done for a distance of about 500 feet. In all other cases the material found in the trench was used for backfilling around the tile.

Breaks have usually occurred in material in which there has been no gravel. Tile lines have stood up very well in gravel. During the last few years there has been a slightly increasing tendency to failure of tile lines in material other than gravel on this project. From reports and observations this condition obtains on other projects wherever a considerable amount of tile drain has been constructed.

On this project breaks have occurred only in quicksand formation, and generally speaking there has been a similarity in the condition in which the tile has been found. In all cases the tile has settled and some of the tile has been broken. This settlement in one case was found to be as much as 3 feet. In all cases the tile was found filled with material, a hole showed in the backfill above the break, and water flowed from this hole.

The generally accepted practice in the Service has been to cover the upper five-eighths to three-fourths of

the circumference of the tile at the joint with tar paper. This leaves an opening at the lower portion of each joint where water can enter the tile line. Even with tile answering the specifications of the United States Reclamation Service it is not always possible to obtain as tight a joint as desired even by turning the tile in laying to secure the best possible fit. In addition, during the construction in this kind of material, water and muck often stand more than halfway up the tile, and it is not always possible to determine with absolute accuracy whether the tightest joint possible has been obtained.

In case a wide joint exists, not only water but the material from under the tile may pass into the tile and be carried away. The tile gradually settles down into the space from which the material has been removed. Such settlement causes a widening of the joint and accelerates the process of settlement. The backfill may arch over until the tile has settled somewhat. The sudden giving away probably results in the crushing of some of the tile at the point of settlement.

Failure of tile lines on the Shoshone project has not been very extensive. The longest failure has not exceeded 150 feet, but as these breaks cost on an average of \$10 per foot to repair, they result in a rather heavy item of expense.

It is evident that failures of tile lines result from a removal of the material underneath the tile, allowing a settlement. This may be due to wide joints or it may take place where the best joint obtainable exists. Often water is forced up through the subgrade, which no doubt aids in forcing material into the tile and, in addition, keeps the subgrade loosened up and in an unstable condition. Such conclusions must of necessity be drawn from circumstantial evidence, but they are the result of several years' experience and embody the conclusions of project employees who have been interested in the construction and maintenance of tile drains.

The problem of preventing such failures must be taken care of in the construction of the drain, if a tile drain is to be a permanent success. There is no decided uniformity of opinion as to the best method of producing this result. There is also considerable doubt whether a tile drain can be made a permanent success in quicksand or fine clay except at a cost that would be prohibitive. The general trend of opinion in the Service seems to be in the direction of discarding the use of tile drains in this kind of soil. In this matter there should be no hasty "jumping at conclusions." There may be methods that will solve the problem.



There are certain conclusions and suggestions that may be offered: (a) To construct a tile line in quicksand or fine clay with gravel or ladders set on piling of sufficient bearing strength to support the tile line may make the tile line cost prohibitive as compared with open-drain construction. To this may be added the doubtful permanency of such a construction. (b) A tile line should have no rigid points of support. It should be allowed considerable flexibility so as to adjust itself to the different conditions of support. This is not practical when drain tile is used. If it were practical to use sewer pipe in such construction, any deviation from a straight line would have a tendency to tighten the joint rather than open it, as in the case of a drain tile line. It is not known whether this has ever been tried and proven feasible. It may be possible that experiments have been tried showing the adaptability of sewer pipe in tile drain work.

The general practice on the Shoshone project in repairing breaks in tile drains is to begin opening the trench below the break where the water is running out of the top of the trench. On account of the amount of water usually in the drain it is impossible to start a crib immediately over the break. The opening of the trench consists of driving solid cribbing in sections 12 to 14 feet in length, 3 or 4 feet wide, depending upon the size of tile. In putting down these cribs 6 by 6 timbers are used as wales and 2 by 8's for lagging or piling. The ground surface is taken off to a depth where the ground will stand up before the crib is started. The lagging is driven down as fast as excavation is made to keep the banks from caving. When the first crib has been put down and the tile has been uncovered the drain is opened by taking out or breaking a tile. This is necessary in order to lower the water in extending the crib over the break. In extending the crib up to the break considerable care has to be used not to fill the tile with mud below where the first crib is put down and the tile opened. In some cases, on account of the large amount of water in the drain, it has been necessary to start the crib 50 to 75 feet below the break, depending upon conditions of the break. In some instances it has been necessary to permit the water to come to the hydraulic gradient of the tile line and wait until the water table has lowered in the fall before the broken line can be relaid. All this work requires hand labor and is very expensive, as it usually takes from 10 days to 2 weeks to open the tile line of most of the breaks on this project. There should be some other method developed that will require less time and be less expensive in repairing these breaks, as the water table is close to the surface for quite a distance up the drain from the break and is running out of the break. This condition exists in practically all of the breaks, and in one instance damage to a farmer's crop was caused for which he made a claim for \$100.

As stated, there are 85 miles of tile drains on this project. It can be very readily seen that occasional breaks are to be expected. If repairs are to be continued as in the past, instead of using wooden piling or lagging, it is believed that light steel sheet piling could be used to better advantage and be less expensive in the long run, as the timber used in opening these drains is practically destroyed and is of no further value except for kindling.

Another important feature in the maintenance of closed drains is the wooden trap boxes. The wooden trap boxes are beginning to deteriorate to such an extent that it will soon be necessary to repair them or replace them. Some of the trap boxes on this project have already decayed to such an extent that they have had to be repaired.

Careful consideration should be given the matter of repairing these trap boxes. The construction of the trap boxes is such that it is a very simple matter to repair them temporarily, by boarding up on the inside of the 4 by 4 posts used as the frame of the structure. This, however, does not secure satisfactory construction, as the nailing must be relied upon entirely to hold the earth pressure, and when decay starts it is usually the nail holes which soften first; consequently the danger of collapse would be much greater in the repaired structure than in the original construction. The water plane does not usually recede in the fall and show the necessity of repairs until so late in the season that the ground is frozen to so great a depth that such repairs from the outside would be very costly. The life of a wooden structure alternately exposed to water and air, which is the condition obtaining in all trap boxes where repairs have been necessary, is from 8 to 10 years. From these facts it would seem that when repairs are required economy would result from the construction of a permanent structure. Aside from the necessity of reconstruction every 8 or 10 years, added security would result from the fact that there would not be the danger of the collapse of a structure where deterioration had not been observed, with the consequent filling of a tile line, the cleaning of which always requires a heavy expense. The lining of the trap box with a fairly thin concrete wall seems to be the simplest solution. This would result in supporting the old timber walls and protecting them from the deteriorating action of air and water. The trap boxes on this project are fairly uniform in dimensions, and it is believed that a collapsible metal form could be designed for this purpose, which, taken with the ease of obtaining materials, would allow an economical and efficient method for this repair, as well as obtaining a permanent structure.

Several instances have occurred on this project when it has been necessary to open a tile line and remove a bucket which had been dropped into a trap box by some careless person, while watering stock or drawing water for domestic purposes, the bucket

being at once carried into the outlet tile and subsequently lodging on a projecting joint and forming a serious obstruction. One instance is also recalled where a particular trap box was broken into several times, with no apparent cause except pure maliciousness or perhaps from a desire to use this as a fish pond. In this case no harm happened to result except the necessity of repairing the cover several times. However, in this same drain it was necessary to remove an obstruction, at great expense, caused by a small piece of timber lodging in the tile and catching sufficient floating weeds to cause a complete obstruction. These weeds could have gotten into the tile only through an open manhole. In breaking open this trap box the above condition could very easily have resulted, as in every case the timber cover was badly splintered. Every precaution possible is taken to protect the trap boxes from these thoughtless acts, but as long as they are constructed from timber only they can always be opened in some way.

It would seem that some consideration should be given the matter of a permanent type of structure at the time of the original construction. Our drainage system is of as great importance and of as permanent character to the project, or at least to those lands benefited, as our canal system. We protect our canals with the best type of construction possible; why not do the same with our drains? The cost of replacing a timber canal structure with a permanent structure is not nearly so great in proportion as that of replacing a timber drain structure, as all the work in the latter case must necessarily be carried on under adverse conditions. Yet our canals are originally supplied with permanent concrete structures, whereas in order to keep our drainage system functioning properly we must continually repair, or replace at exorbitant expense. It is believed that a cost analysis of the two types of construction would show considerable economy in permanent original construction.

It has been the practice on this project to clean trap boxes twice a year—in the spring and fall. In the spring there is very little sand in the bottom of the boxes. In the fall, after the heavy run of water, the bottoms of the boxes are practically full of sand. It is a question whether it is necessary to clean these trap boxes, as there is plenty of room for sand to deposit at the end of drains and there has been no indication of sand lodging in the tile. At the time of constructing drains it was believed that after a drain had been in operation for a year or so very little sand would get into the drains. However, this has not proven to be the case, as the drains that were constructed eight years ago are now carrying nearly the amount of sand they did the year after construction.

It is much more fun to watch your money grow than to watch it go. Buy War Savings Stamps.

## SAVING THE CROPS BY STORAGE.

By W. R. Beattie, Bureau of Plant Industry,  
United States Department of Agriculture.

**V**EGETABLES and fruits were grown in abundance in the gardens and orchards this year, and the problem that now confronts the people is to care for the surplus and store it for winter use. Great quantities have been canned, dried, and otherwise preserved, but there still remains the great bulk of the potato crop and root crops to be cared for by means of storage. Just at present in the apple sections thousands of bushels of apples are either lying upon the ground or are ready to be gathered, and it is doubtful if anything like the entire crop can be properly cared for. People were encouraged to plant gardens as a safeguard against a possible food shortage, and now effort is being made to induce them to properly store whatever is left in the garden and have it for later use.



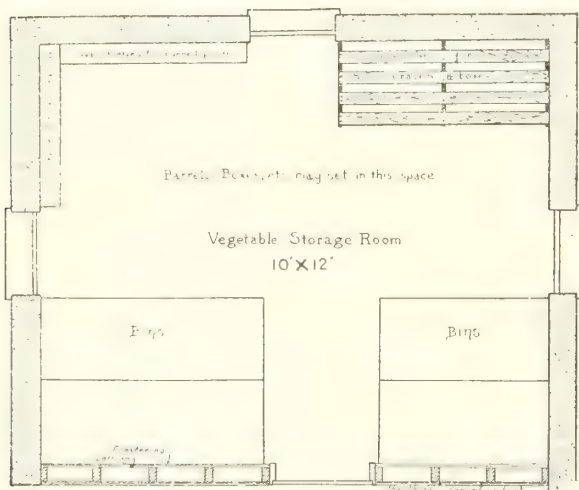
Outdoor storage cellar for storing sweet potatoes and other root crops. It consists of a pole and plank frame covered with sod or straw.

The essentials of a satisfactory fruit and vegetable storage cellar—for the greater number of vegetables, at least—are plenty of ventilation, control of moisture, and a reasonably low temperature, so long as it is above freezing. The three most common types of storage are: First, cellars underneath the dwelling; second, an outdoor cellar; and, third, pits or banks in the open ground. The choice will depend upon local circumstances, and where a good cellar is available it is perhaps the best type of storage to use. It often happens, however, that the cellar is too warm for the proper storage of vegetables. In that case it is necessary to partition off a portion of the space and provide extra ventilation to keep down the temperature.

Throughout the Southern States and in many parts of the North special outdoor pits or cellars are constructed. In many sections these are referred to as "cyclone cellars." However, they are usually built not for protection against storms primarily, but as storage space. The construction of these outdoor cellars is very simple where plenty of timber may be had. Two posts about 8 feet in height are set in the ground and a ridgepole placed upon them. Split



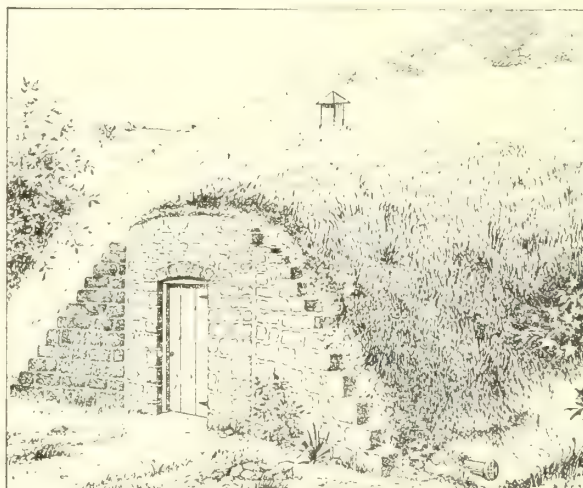
timbers or planks are laid with one end resting upon the ridgepole and the other end on the ground in the shape of a letter A. The ends are boarded up, a door being provided in one end and a ventilator in the top, and the entire structure covered over with 6 to 12 or more inches of earth. In certain parts of the West these cellars are built of sods piled one upon the other. This makes a very effective and frost-proof storage pit.



Floor plan, showing the possibility of constructing a storage room by partitioning off the portion of the cellar under the wing of the house.

The pit or bank is simply a conical-shaped mound placed above ground and surrounded by a shallow trench to carry off the water. It is used for the storage of carrots, beets, turnips, potatoes, and apples. Of these, potatoes only will not withstand slight frosting. The losses, however, of potatoes stored in this manner are as a rule very great. The extension division of Purdue University, Lafayette, Ind., has put on some splendid demonstrations upon the proper methods of constructing these pits. First the ground is leveled and the necessary drainage provided. A thin layer of straw is then spread upon the ground on which to store the potatoes or other product, which is piled in a conical pile, a loosely constructed square wooden box or tube being inserted in the top of the pile for ventilation. For best results this tube should be run to the bottom of the pile. Building paper is then spread over the potatoes or whatever is being stored and a light layer of straw put on. To this is added about 3 inches of soil, then another layer of straw and another layer of soil. If the weather promises to be very cold, a third layer of straw and soil is added. When completed the pit will be about 5 or 6 feet in height and 7 or 8 feet in diameter at the bottom, with the ventilator box sticking a few inches above the top. Sometimes sods are cut and spread over the top of the pit to make it waterproof, and during cold weather the box venti-

lator is closed by stuffing it with an old sack or covering it entirely with straw and earth. The great objection to this type of pit in the North is that the contents can not be readily gotten out during cold weather when the ground is hard frozen, and the outdoor cellar has several advantages over it. Perhaps there is no better form of storage than the sod or, in certain sections, the adobe, pit, or house, built either partially below the surface or entirely above ground. The pit or outdoor cellar of this character can be used for the storage of practically all of the common garden vegetables and certain of the fruits.



A well-protected root cellar in a hillside.

One difficulty in the control of all this class of storage is to get the temperature low enough at the time the fruits or vegetables are being placed in storage. At this time of the year the days are generally rather warm, but the nights are cool; and by providing plenty of ventilation and keeping the storage cellar closed during the heated part of the day, the temperature can be gradually lowered. Another important provision is to have the storage cellar reasonably dry. However, if the air is kept extremely dry it will cause the fruits or vegetables to shrivel. Pumpkins, squashes, and sweet potatoes require a relatively warm and dry atmosphere for their proper storage. Irish potatoes and the root crops will stand some moisture, and the ideal temperature for their best preservation would be about 40°, wherever this can be secured. Sweet potatoes and the pumpkin group should be cured at 80° or 90° for a few days and then be kept at from 54° to 56°, or below a living-room temperature.

Vegetables that are to be placed in storage should, if possible, be dug when the ground is reasonably dry so that the dirt will not adhere to them. Under no circumstances should they be washed before placing them in storage. It is a good plan to bury carrots,

beets, and that class of vegetables in sand containing just a little moisture.

As a rule there will be an abundance of green tomatoes on the vines at the time of the first frost. One very good method of caring for these and ripening them is to pull up the entire vine and hang it in the storage cellar with the tomatoes attached. Another method is to remove all the tomatoes that have begun to show a tendency to mature, wrap each separately in thin wrapping paper, and lay them in shallow trays or boxes in the storage cellar. Where they are not wrapped they should be spread in a single layer and not touching each other on a shelf in the cellar. It is important to place them in storage before they have been touched with frost.

The storage cellar, especially if a portion of the cellar under the house is used for the purpose, needs frequent attention to see that none of the stored products

are decaying and causing bad odors or resulting in the decay of other vegetables with which they come in contact. Keeping the cellar closed during the daytime and ventilating at night will have a tendency to keep out any little fruit flies that are so troublesome where fruit is decaying. Screening the openings with very fine wire or with a thin grade of cheesecloth is also an advantage in keeping out these insects.

The proper gathering of the products to be stored is very important. Special care should be taken that they are not bruised or otherwise damaged in handling, as their keeping quality depends largely upon the observation of this point.

Not only can the season for fresh vegetables be greatly prolonged by the use of a storage cellar, but a great saving in living costs can be had by properly storing all the surplus products of the garden and or hard.

## NOTES FROM THE NORTH PLATTE (INTERSTATE) PROJECT.

By B. J. Seger, Secretary-Treasurer, North Platte Valley Water Users' Association.

### CROP PESTS.

**G**RASSHOPPERS are not so numerous in the North Platte Valley this year as last. It is noted that where a good job of poisoning was done last year few are in evidence this year. The plan for poisoning is practically the same as last year: Sodium arsenate, stock molasses, anise oil, and sal soda are mixed with bran with a concrete mixer and put out 100 pounds to the sack. As bran is so high this year, dried beet pulp is mixed with the bran half and half with good results. Mr. R. O. Fithian was appointed by the county commissioners as pest inspector for Scotts Bluff County. He is on the job and the delinquent farmer has his duty in the matter of poisoning hoppers impressed upon him in no mistaken terms. If the owner does not get busy, the inspector hires the work done and has it charged to the land to be paid with taxes. Only two poison plants are being operated this year, whereas last year the demand kept five plants running steadily for two months; 1,500,000 pounds of grasshopper poison were used last year.

**Army worm.**—In the early part of July the army worm was in evidence in destructive numbers on a number of farms in the valley. County Agent Sheldon found that poisoned bran mixed the same as for grasshoppers was very effective, and warning was sent out to all the farmers to be on the lookout for the army worm and, if found, instructions were given how to destroy the pest. Mr. Fithian did very effective work in helping the farmers to locate and destroy this pest.

**Web worm.**—The web worm did little damage this year owing to the very effective work done last year with the poison sprayers.

**Potato bugs.** Potato bugs began to make inroads on a number of potato fields in the valley. The poison sprayers used for the web worm last year were put into use where needed. Arsenic of lead was used in solution. The Water Users' Association and Farmers' Irrigation District shipped in by express 300 pounds of arsenic of lead, so that there would be no delay and farmers could get it in quantities sufficient to go over a large field. One application was usually sufficient to clean a field of the bugs. Arsenic of lead was found to be more effective than Paris green as it would stick to the leaves, whereas Paris green would be readily washed off by rain.

### CROPS.

Crops under the North Platte (Interstate) project were never better than they are this year, especially beets and alfalfa. There are approximately 70,000 acres of sugar beets in the North Platte Valley this year, and the entire acreage will average a better stand than last year. Eighteen thousand four hundred and thirty-four acres are under the Interstate or Government project and about the same acreage is under the Farmers' Irrigation District canal. The entire beet crop should bring in \$10,000,000 at the present contract price.

### IMPROVEMENTS.

A new sugar factory is being built at Mitchell, Nebr., by the Great Western Sugar Co., and will be ready for operation in time for this year's crop.



The Great Western is also building a sugar factory at Minatare, Nebr., which will be completed in time for 1921 crop. The Cooperative Farmers' Union Sugar Co. will also build a sugar factory at Minatare, to be completed in time for next year's crop. This will make a total of 6 sugar factories within a radius of 35 miles. Beet railroads have been built out from the towns of Bayard, Scottsbluff, and Mitchell, totaling 50 miles of track and 12 beet dumps.

The by-products from 6 sugar factories and beet tops from 75,000 to 80,000 acres of sugar beets will furnish splendid feed for thousands of cattle and sheep as well as dairy cows. Our farmers realize more than ever before that the feeding of cattle and sheep or the maintaining of a dairy herd must go hand in hand with sugar-beet raising to make sure returns every year.

#### ANNUAL PICNIC.

Some 200 boys and girls, members of the various clubs of the county, he'd a picnic at the experiment farm recently and report having had an exceptionally fine time. There were "eats" galore and a number of spirited contests of various kinds, which produced lots of fun. The winners of the various races were as follows:

*Blind-folded race.*—Walter McAnich, Nine Mile Calf Club, first; Minnie Schwindt, District 10 Club, second; Minnie Romey, Lake Alice Cooking Club, third.

*Cracker-eating contest.*—Ivan Catlett, Nine Mile Calf Club, first; Olive Prickett, Lake Alice Cooking Club, second; Ila Catlett, Nine Mile Sewing Club, third.

*Three-legged race.*—Sunflower Pig Club, first; Nine Mile Calf Club, second.

*Newspaper race.*—Minnie Huber, Sunny Buttes Sewing Club, first; Erma Shuck, Lake Alice Cooking Club, second; Kenneth Brown, Sunflower Pig Club, third.

*25-yard dash for boys.*—H. Whitcomb, Nine Mile Calf Club, first; Thomas Duncan, Busy Bee Garden Club, second; Ray Barrett, Sunflower Pig Club, third.

*Peanut race.*—Floyd Hodges, Nine Mile Calf Club, first; Gladys Kellett, Lake Alice Cooking Club, second; Ray Barrett, Sunflower Pig Club, third.

*Twenty-five yard dash for girls.*—Bessie Garton, Busy Bee Garden Club, first; Olive Prickett, Lake Alice Cooking Club, second; Abbie Hodges, Nine Mile Sewing Club, third.

In addition to the races, the children all united in singing the Nebraska club songs and yells. Miss Mary Ellen Brown, assistant State club leader, gave a very interesting talk on club work in Nebraska. Each club gave a report of progress as follows:

Hazel Hudson, for Nine Mile Sewing Club; Ruth Davis, for Winner Sewing Club; Myrtle Robb, for Sunny Buttes; Olive Prickett, for Lake Alice Cooking Club; Willie Hoffman, of Busy Bee Garden Club;

Huber Whitcomb, of Nine Mile Calf Club; Ray Barrett, for Sunflower Pig Club; Velma Adams, for Henry Sewing Club.

A demonstration business session was also given by the Winners Sewing Club.

The picnic was in charge of Miss Brown, Miss Richert, and Phil Sheldon.

#### ORGANIZATION OF MARKETING AGENCY.

A meeting of the Nebraska Potato Improvement Association was held at Alliance Friday, August 6, 1920. It was voted to capitalize the exchange at \$20,000 and to sell shares at \$10 each, not more than five shares each to start the organization. The organization will be placed in full operation as soon as 25 per cent of the capital stock, \$5,000, has been subscribed. In so far as possible the various county organizations of the State will be invited to cooperate with the new exchange for the benefit of the potato growers.

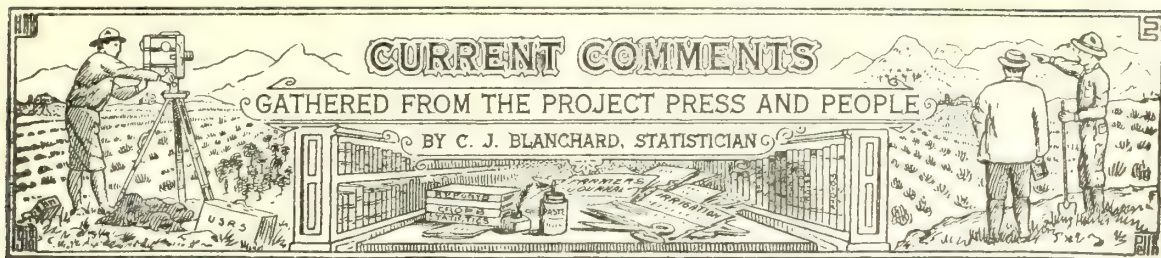
The prime object of the exchange will be to locate the best markets for the potatoes it handles; to secure more equitable distribution of cars for loading; to create new markets for Nebraska potatoes; to eliminate many of the losses in marketing by employing men with a special knowledge of marketing conditions. This will be a long step in the right direction. Potato growers have become discouraged in trying to raise potatoes because of market conditions and lack of cars at the time they wish to put the crop on the market.

With such an organization conditions should be improved to such an extent that a farmer would feel as certain of adequate returns from a crop of potatoes as from any other crop.

#### POTATO INSPECTION TRIP.

On August 17, Prof. G. W. Goss, plant pathologist; Prof. H. O. Werner, associate horticulturist and potato specialist; and Prof. M. H. Swenk, State entomologist, all from the State University of Lincoln, Nebr., together with County Agent Sheldon, made an inspection tour over the county for the purpose of examining some half dozen experimental potato plants, also some potato fields. The object of the inspection tour was to determine the best sources of seed and to demonstrate to growers the value of good seed and the importance of careful selection each year if the best results are to be obtained. A number of potato growers were in the party and much valuable information was obtained.

Exposure to weather often causes greater destruction to farm implements than using them. Avoid this loss by storing all machinery and tools properly under shelter before winter sets in.



THE fall tour of the statistician and photographer arranged in cooperation with a number of active organizations on our projects began on July 31, when we bade farewell to the Nation's Capital and its sweltering heat. After a brief stop-over in the Twin Cities we headed west via the Oriental Limited, and in due time reached Montana's progressive and beautiful city of Great Falls, the focal and business center of the Sun River project. Here we discovered that Project Manager Sanford and Scott Leavitt, secretary of Great Falls Chamber of Commerce, had prepared for us a strenuous program, which embraced pictorially an area so broad that at first glance it seemed impossible to cover it. The perimeter of our territory included such distant points as the Highwood and Little Belt Mountains, the Sun River Canyon, Valier, and the power plants on the Missouri River. To compass this vast area we had allotted only eight days, and the very first day it rained. Our cameras were carefully overhauled, plates and films were loaded and packed for the autos, and on the second morning at 7 o'clock sharp we began the photographic survey of this remarkable section of Montana.

In seven days, working every minute of sunshine, we covered 1,200 miles by auto, for the most part on excellent graveled highways.

The country as a whole was at its best. It was the season of harvest, and the fields of golden grain were falling before the harvester. The huge stacks which dotted the wide landscape betokened a general harvest of wheat and oats. On the broad plateaus near the mountain and on the gentle slopes the fields of grain extended endlessly. In many of these the hum of thrashing outfits made music joyful to the farmers' ears. There was gladness everywhere. We visited beautiful ranch homes nestling close to the shoulders of the mountains or beside the crystal streams. We climbed skyward to the region of big pines and traversed swiftly deep canyons, through which sparkling brooks dashed onward to the great river. From lofty heights we scanned an empire of rolling plains, check-boarded with fields of golden grain or vernal alfalfa.

Scenically the trip embraced much to delight the photographer, and our pictures should prove valuable in making these spots of beauty more familiar to the tourist.

The resources of Great Falls back country are too varied and numerous to be portrayed in a short article. In agriculture, industry, forestry, and minerals they embrace a wide range. The mighty river which drains this region drops over many precipices, and here the genius of the electric engineer has found a splendid opportunity for expression in huge power plants. The harnessed lightning to-day moves the wheels of innumerable factories, enormous smelters, mills, and mines, and in part operates for 400 miles a transcontinental railway. Thousands of miles of transmission lines, crossing and recrossing the Great Plains, threading the forested mountains, and penetrating the dark canyons, bring the power and light to cities, towns, hamlets, and homes. The enormous present and future value of this great reserve of cheap power is just becoming recognized, and with the increase of wealth among the farmers is being more rapidly utilized each year. Its influence in attracting farmers and manufacturers can not be estimated.

Two reclamation projects were covered in our survey, the Sun River, a Government enterprise, and the Valier, a Carey Act project. Both are enjoying a large measure of prosperity and success, but both are in need of more experienced farmers. It is only too evident on each that the present farm operators have extended their efforts over too much land, with the usual results of waste and economic loss. Farming here remains altogether too much a gamble. Lands are not properly tilled, and consequently do not produce maximum yields. Hundreds of acres of wheat were only disked, and a thin, scraggly stubble emphasized the futility of this sort of farming. The wonder of it is that any crops are harvested by this system. For the Valier project the outlook is most cheering. The vexing problems of finance have been solved, and the burden of making the desert blossom is now solely one of the farmer. Fortunately for this project there has been no boom in land prices. Excellent farm lands can be obtained on terms and at prices which assure success to the practical husbandman.

The Sun River project was a surprise and a revelation. After many trials and tribulations, after vexatious delays and provoking disputes, the project at last has made a turn about and is headed straight for prosperity.



Our settlers are getting into the collar, and are making real progress in developing their lands. Many are spreading their efforts thinly over too much land, but this mistake will not continue long. New settlers are coming in, the largest ranches are being subdivided, and better use of water is evident everywhere. A very cheering sign is the coming of an experienced class of farmers from our other projects. The community from the Shoshone project comprises a lot of live wires who, with experience gained in reclaiming the Wyoming desert, and money gained from sales of their developed ranches, have jumped into the game again on the Sun River and are setting a fine example for the old timer as well as the newcomer. Headed by Al Byers, one of Shoshone's most successful pioneers, these farmers have made astonishing success here. According to Byers the Sun River lands are much easier to reclaim than the Shoshone, being more level and with a richer natural soil. At present prices for land he considers the opportunity on the Sun River the best in the country. In this opinion he has the unqualified indorsement of his neighbors who followed him here. Byers expects a single crop of wheat this year to more than pay the purchase price of his land, and we will say it looks like it to us. All the towns on the project are looking fine. Many new business houses are in evidence since our last trip, and there is decided improvement in the type of new ranch homes.

State and county highways, graded and graveled, make the tour of the project comfortable and easy. The homeseeker with auto will find the project a delightful place to visit, and shrewd investors will not seek in vain for bargains. We shall have no hesitation from now on in recommending inquirers to this project because we are convinced of its future progress.

Throughout the valley it was most pleasing to note the almost unanimous sentiment in favor of national reclamation. It is history that when this period arrives on one of our projects everything changes for the better. Cooperation between the farmers and the Service is always followed by cooperation among themselves, and this leads inevitably to a distinct betterment of conditions agriculturally and socially.

One of the memorable and pleasurable incidents of our tour was a visit with Hon. Paris Gibson, the founder of Great Falls and its most beloved citizen. He has grown old in the service of his city and his State. Before his eyes grew dim with age he saw the dream of years come true; and still living in the sight of a triumphant reality, he hears the acclaim of thousands of friends. With voice and pen, in the halls of the National Congress, and in civic centers of the West, his influence has been directed powerfully and always honestly for national reclamation, for civic righteousness. Time in its swift flight may soon take him from the scene of his great work, but the memory of his good deeds will never fade so long as the melting snows and rushing waters continue to fructify the thirsty desert of our splendid West.

#### NOTED HERE AND THERE.

*Arizona, Salt River project.* It is estimated that it will cost \$6,000,000 to pick the cotton crop of Salt River Valley this year. This expenditure exceeds by a million dollars the total gross value of all crops during several of the early years of the project and indicates in a striking way the enormous development that has taken place here in the past decade.

The report of the first buying of lint cotton by the Martin Cotton Co. for 85 cents a pound has been responsible for establishing the opening market for the long staple. Rumors placed the opening price at 60 to 65 cents a pound, and the present price for October delivery is a source of supreme satisfaction to the grower.

Chandler recently celebrated the opening of a new \$35,000 ice plant with a daily capacity of 16 tons.

*California, Orland project.*—Watermelons by the carload were shipped from Orland during August. The first carload of the big juicy fellows was loaded by C. S. Tout and shipped to the Portland market. Approximately 1,500 melons were loaded onto the car, each weighing from 30 to 40 pounds. The car was followed by several more which went to supply the northern market. The melons were raised by Mr. Tout on the old Reager Ranch which Mr. Tout purchased last fall. The melons are exceptionally fine ones, being uniform in color and size. It is believed that this is the first of a big industry here, and that in a few years melons will leave the land of Orland by the trainload rather than the carload.

Orland has the proud distinction of being one of the very few districts of the coast, if not the only district, where every single herd of pure-bred Jerseys is tubercular free. The Glenn County Fair this year will have the distinction of showing nothing but absolutely healthy pure-bred Jerseys. Among the herds of Jerseys found 100 per cent were those belonging to M. Fortini, Guy Baugher, Stull, Whitsett, Gurnett, Gearhart, Rider, and Dado.

*Colorado, Grand Valley project.*—The harvesting of grain is practically over in the lower valley. Reports of yields are that wheat thrashed out from 40 to 50 bushels, and frequently over that figure; one field of oats on the Taylor ranch just west of Fruita showed a yield of 104 bushels to the acre.

The harvest of early potatoes is also in full swing, and numerous carload shipments are going out from that point. The yield is heavy and the crop will prove profitable to growers.

This year promises to prove a profitable one not only to the horticulturists and agriculturists over the western slope, but to the bee growers as well. It is stated that this year is the best for honey experienced for the past five years, and that as a result the output of both strained and comb honey from over the slope will be considerably larger.

F. B. Hill, rancher, north and west of the city, who devotes much attention to his bees, estimates that this year he will have 20 tons of honey to market.

Other bee growers over the valley also report a heavy yield, and many tons of high-grade honey will go out this fall from Mesa County.

*Colorado, Uncompahgre project.*—Some of the county officials have been going over the valley estimating the value of the 1920 crop, and it is the consensus of opinion among them that, judged by past years and by the acreage in this year, the 1920 crop in this valley will reach a total valuation of between seven and eight million dollars. Some of the various crops are estimated as follows: Wheat 660,000 bushels, worth \$1,300,000; beets, \$1,000,000; potatoes, \$1,000,000; hay, \$2,000,000; onions and onion seed, \$200,000; oats and barley, \$200,000; bean seed, \$30,000; squash, turnips, corn, corn silage, etc., \$200,000; apples, \$350,000.

A short time ago J. F. Roper, Spring Creek Mesa farmer, was offered \$100 for the fruit on four apricot trees of one of the large, luscious varieties. Mr. Roper refused the offer, and then, at the request of the county agent, kept close track of the yield of the four trees. He took 125 boxes of apricots off the trees, which brought returns averaging \$2 per box. In addition to the 125 boxes, the trees yielded two families all the apricots they wanted for home consumption, and, besides, there was the waste which always occurs when overripe fruit falls to the ground.

*Idaho, Minidoka project.*—P. A. Williams, of Burley, Idaho, speaking before the farm bureau grain committee at the Hotel Utah, told his hearers that Idaho potatoes, wrapped in tissue paper and displayed in attractive boxes, have been selling for 25 cents each in New York City. The potatoes so sold, he said, are of the Netted Gem variety, golden hued and oval shaped. Bet you these were grown on the Minidoka project.

Minidoka and Cassia Counties are becoming noted for the quality of their Shorthorns. Although the number is not great, it is being increased rapidly by the importation of the best animals the markets afford and breeding at home. The various herds are in a thriving and satisfactory condition. The great value of the small herds scattered over the two counties at this time is that they are demonstrating to our farmers that it does not cost any more to produce a good animal than it does to grow a scrub, and they are creating much interest in pure-bred live stock of all kinds.

*Nevada, Newlands project.*—We have given a part of this project a casual once over, but it is enough to satisfy us that the Newlands project is now headed right. For more than two years a fine class of farmers has been coming in, and they are making good.

Demand for lands far exceeds the supply, and the Service is besieged with inquiries as to future openings.

This has been a first-class year for crops here, and the spirit of the country is optimistic. Getting behind the Government with a boost, and not a knock, is going to result in a big change here, and for the better.

After crossing two or three hundred miles of Nevada's dusty desert it is certainly a relief, restful and soothing, to drop down to Fallon and see the wide vista of alfalfa ready for the third cutting. To look down long rows of spuds ripening for the fall and winter markets, and to be turned loose into big fields of luscious cantaloupes, golden-hearted and divinely flavored, is an experience not soon forgotten by one who remembers this section back in 1902.

The Newlands farmer assured by Lahontan storage is cheerful and not unsympathetic toward his less fortunate neighbors along the Humboldt, whose dry bed for the better part of two years past has spelled hard luck for the latter.

The irrigation district is functioning vigorously. It is going after drainage strongly. Its directors are men of influence, and have the confidence of the community and the Government.

Glancing over the local paper on our arrival we were shocked to read in glaring headlines the following: "New manager for Newlands project arrives." Examination of the article greatly relieved our apprehension, for it disclosed the fact that Project Manager Richardson and his wife had been visited by the stork, which had delivered a son to them on this its third call. On each former occasion it was a son also. According to rumor the third visit upset all the family and friends, and at the same time destroyed the confidence of members of the Ouija society here. By the usual infallible signs and tokens of the board, revealed at numerous sittings, the recent visit of the stork should have heralded the arrival of a daughter to the Richardson household. So confident were Mrs. Richardson and her neighbors that the readings of the board could not fail, all of them for some time past have been engaged in the delightful pastime of making up a wardrobe of those fleecy, filmy garments with which mothers are wont to envelop the female infant. Naturally the arrival of a husky boy caused consternation and dismay. With wardrobe crowded full of dainty lingerie suited admirably for a rosy girl baby, and not a single garment for a boy, all the women are provoked and much inclined to vent their disappointment upon the thoughtless father. Pending necessary alterations and additions to his wardrobe a lusty lad is hiding his robust form beneath a lot of lacy dresses, and probably blushing furiously the while. We are glad to record that the boy measures up to the full stature expected in the irrigated country, and we welcome him into the big family of Reclamation youngsters.



*Oregon, Umatilla project.*—Five years ago the farmers of the Umatilla project started putting registered Jersey stock into their herds. To-day men who know good stock when they see it are complimenting Hermiston on the quality of the stock they raise.

There are 10 so-called "gold medal bulls" in the world, and 4 of them are represented in their descendants on the Umatilla project, which has about 100 registered Jersey cattle. These four sires are Silver Chimes of S. B., Rosaire's Olga Lad, St. Mawes, and Golden Glow's Chief, and to the breeder no better guaranty is needed as to the place Hermiston herds take in the country.

The Jersey Bull Association on the project is the oldest in the Western States and one of the most successful in the United States. Since its formation it has been used as a pattern for 26 other associations in the Western States. There are six bulls in the Hermiston organization at the present time.

*Wyoming, Shoshone project.*—O. E. Beaver, who has a farm on the east side of the project, has a 15-acre patch of potatoes, which is said by many who have seen it to be the finest on the project, considering the acreage. These potatoes are the gold coin variety, which were first introduced here last year. Just recently, when they were in full bloom, the whole field looked like a flower bed.

Mr. Beaver says that the potatoes are setting on very heavy and evenly in size. At digging time no doubt this field will be watched with great interest. Mr. Beaver has been growing potatoes for several years, but believes this to be the year he will top the yield and grade.

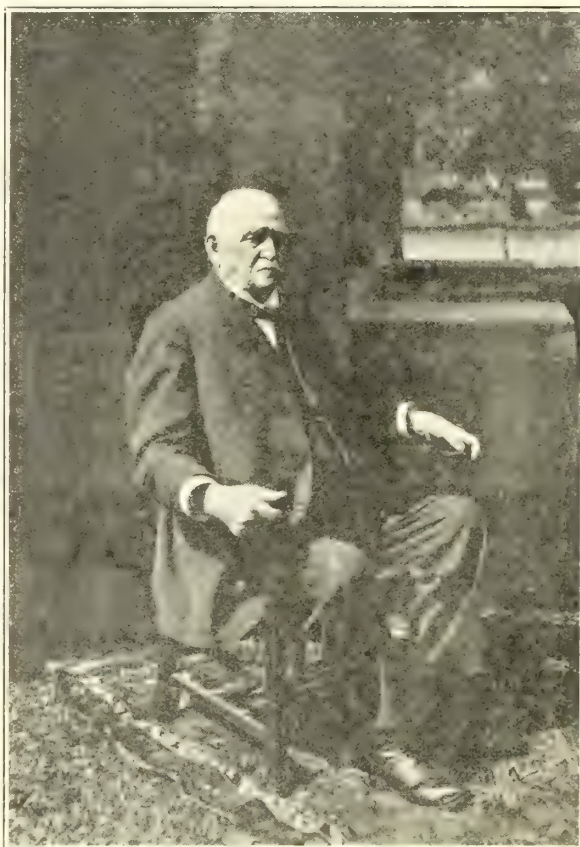
The Shoshone project is to have the benefit of a dehydrating plant which is to be operated at Cowley. The plant will also manufacture potato starch and flour. Its capacity will be 3 cars of spuds daily. With slight change, if the potatoes can be obtained, this can be increased. When it is considered that this factory only buys unmarketable second and cull potatoes, which constitute about 20 per cent of an ordinary crop in this country, it will be seen that there is plenty of room for all the potatoes at this factory that can be grown in the adjacent country to the plant. Thus from above data it will be seen that to have an average year's run of 100 to 150 days it will take from 300 to 450 cars of culls. Potatoes can be grown in this country, and the company will support the farmers to make this the best and largest potato-producing section of the United States. The farmers in their turn should support the factory, and will be reaping a profit from what is ordinarily an unmarketable and unprofitable part of potato growing.

The investment of \$170,000 that the company has put into this plant will tend to stabilize the industry.—C. J. B.

## SENATOR PARIS GIBSON.

By Morris Bien, Assistant Director, U. S. R. S.

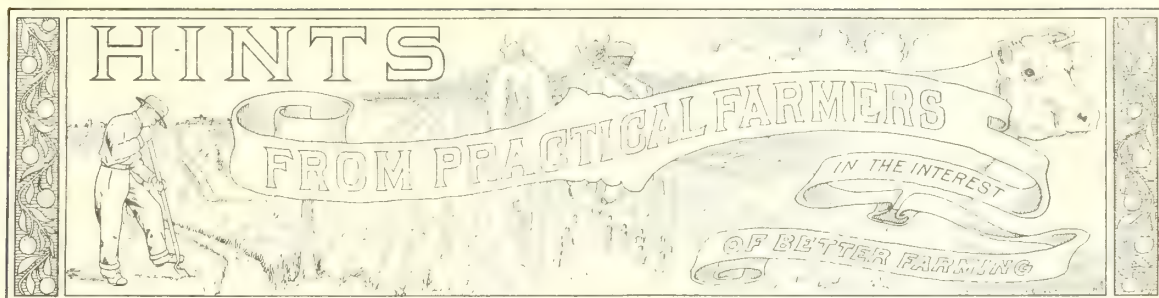
Senator Paris Gibson was one of the important factors in the creation of the Sun River project. Soon after the passage of the Reclamation Act, the Senator, on June 8, 1904, made inquiries as to the existing conditions and possibilities of a development on the lands between the Sun and Teton Rivers. He followed this up actively until the expiration of his term in the Senate in the next year. Afterwards he continued giving his best efforts, and ultimately was among those who were strongest in securing the approval of the Secretary to the adoption of the project, which was on February 26, 1906, the preliminary surveys having begun in the previous year.



Senator Paris Gibson.

The Senator's interest has not waned since the work was begun because he was always glad to see any members of the Reclamation Service who happened to be in Great Falls, and never failed to give them a most cordial reception and an invitation to return.

(Continued on page 461.)



### Pure-Bred Sires and Herd Improvement.

**A**LEXANDER JACKSON, agricultural agent of the Chicago, Rock Island & Pacific Railway Co., is the author of the following circular on the above subject, which should appeal from a dollar-and-cents standpoint to every farmer on our projects who wishes to build up a paying dairy herd.

The accompanying table, showing what can be accomplished by the use of pure-bred sires with scrub cows, may be instructive to farmers engaged in dairy farming on a small scale and possibly not in position to invest in good high-grade milk cows as a starter, but who are at the same time desirous of making their cows a profitable instead of a losing proposition and building up their herds through the medium of a pure-bred sire.

In order to make a real test of what pure-bred sires can accomplish with scrub cows and develop the herd into a paying proposition the Iowa State Agricultural College made these tests on a bunch of very inferior scrub cows—typical star boarders—purchased in an isolated region of Arkansas, and the results as shown speak for themselves. The first generation of grades show an average production of 261.93 pounds of butter fat as compared with 182.40 pounds by their scrub dams, or an increase of 44 per cent; the second generation grades produced 375.81 pounds of

butter fat on the average, or 106 per cent more than their scrub granddams.

Keep in mind that a scrub always produces a scrub, and, as a rule, a worse scrub than his or her parents.

The tests showed that the first generation grades are much superior to their dams in dairy conformation.

Many of the first generation grades showed the characteristic color of their sire's breed; however, in the case of the Holstein this was not so pronounced until the second generation.

#### *Average production of two generations of grades and their scrub ancestors.*

Group (sires).	Dams (scrub).		Daughters (one-half).		Granddaughters (three-fourths).	
	Milk.	Fat.	Milk.	Fat.	Milk.	Fat.
	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Pounds.</i>
Holstein .....	3,673.8	167.36	6,757.5	275.66	10,063.2	385.46
Guernsey .....	4,496.6	199.62	4,843.8	229.74	7,744.9	388.23
Jersey .....	3,394.0	172.52	5,460.5	298.00	5,389.2	282.92
Average.	3,847.0	182.40	5,944.7	261.93	8,311.4	375.81

#### INCREASE IN PRODUCTION.

Group.	First generation.		Second generation.	
	Milk.	Fat.	Milk.	Fat.
	<i>Percent.</i>	<i>Percent.</i>	<i>Percent.</i>	<i>Percent.</i>
Holstein .....	84	65	174	130
Guernsey .....	8	15	72	94
Jersey .....	61	73	59	64
Average.....	55	44	116	106

### Senator Paris Gibson.

(Continued from page 460.)

The Senator represents one of the best types of the western pioneer. Born on July 1, 1830, he graduated from Bowdoin College in 1851, and in 1858 built the first flour mill and the first woolen mill in Minneapolis. In 1879 he settled at Fort Benton; and becoming impressed with the great falls of the Missouri, in 1882 founded the city of Great Falls. He was active in the State constitutional convention, was a member of the Montana Senate in 1891, and United States Senator from 1901-1905.

No greater pleasure can come to a man who is able to look back on 90 years of life than to realize his large part in the great development which has taken place in the State of Montana.

### Sire and Dam Ratios.

Developments in the "Better Sires—Better Stock" campaign have resulted in figures showing the relative number of males and females kept for breeding purposes. Following are the ratios based on more than 200,000 head of stock of all kinds listed with the United States Department of Agriculture:

Cattle.....1 bull to 18.9 cows.  
Horses.....1 stallion to 16.9 mares.



Swine	.1 boar to 11.5 sows.
Sheep	.1 ram to 37 ewes.
Goats	1 buck to 26.6 does.
Poultry-----	1 rooster to 23.3 hens.
Other poultry, geese, ducks, turkeys, etc. (average)----	1 male to 8.5 females.

These figures represent conditions on more than 2,000 farms in various parts of the country and are believed to be typical of other farms. They show the importance of placing stress on quality in sires, since in practically all cases a sire is the parent of a very much larger number of offspring than the average female animal.

### Farmers' Bull Clubs Will "Work."

Are you one of those who think a bull association can not be formed in a community like yours? asks the United States Department of Agriculture. If so, probably you are mistaken, for experience shows that bull associations are adaptable to nearly every kind of dairy community that can be found. The annual report of the Dairy Division shows that there are now about 120 bull associations in 30 different States of the Union, and among all classes of communities.

The extension men of the Dairy Division find that in very many cases, when the idea of a bull association is discussed, people think that, while such an organization is clearly a good thing on general principles, the conditions in their particular community are not suitable. Many times, in such places, it has been tried, and to the surprise of some it has been found that the conditions did not stand in the way at all. There are many such communities. They have men engaged in dairying; they have scrub or other inferior bulls which should be replaced; and they have the need for better bulls.

Any community in which there are 200 or more cows can better afford to have a bull association than it can afford to be without one; and if the people of the community are neighborly and able to work together in every-day business affairs they can just as well have a strong association with all its benefits.

### Selling Pigs and Buying Pork no Profit for Farmer.

There's a profit in selling pigs and buying pork—but not for the farmer who follows this practice. The farmer's most profitable course is to kill, cure, and can enough pork for his own use and sell any additional amounts which he can produce and for which there is a demand. The practice of home curing pork has suffered through neglect, but it is now being revived, according to the Bureau of Animal Industry and the States Relations Service. These two bureaus of the United States Department of Agriculture are cooperating to encourage the general adoption of this wholesome usage among farmers. Home-cured pork,

scrapple, pork pudding, sausage, canned pork, head-cheese, and lard are among the foods which the farmer should get from his own cellar shelves and not from the city market. All transportation costs and commissions remain in his pockets.

A bulletin, "Killing Hogs and Curing Pork," now being revised by the Department of Agriculture, will soon be ready for issue. New methods and improvements have been given space in this discussion, and details of the processes for canning fresh pork have been added. Canning preserves pork with fresh pork flavors and lessens the toil and time incident to some of the older ways of curing the product. Besides being rapid and simple, the new process saves pounds of pork for all periods of the year which formerly had to be eaten soon after slaughter or be wasted.

### Sheep Make Waste Pasture Into Meat.

The keeping of a reasonable number of sheep on the average farm does not necessitate the keeping of fewer dairy cows or other grazing stock. This fact was determined by the United States Department of Agriculture in its recent investigation of sheep-raising possibilities in New England. It was found that farms where sheep are kept successfully have practically the same number and kinds of other live stock as other farms of like area where no sheep are kept, and that the acreage in crops on the two classes of farms is substantially the same. The inference is that the farmer who keeps no sheep is simply throwing away enough pasturage that cows and other live stock do not utilize to net him a profit.

### More Food Value From Corn As Silage Than Other Crops.

Almost any green crop can be made into silage successfully. Much care, however, must be taken to expel the air from such hollow-stemmed plants as the small cereal grains by cutting fine and packing firmly. Other crops, of which legumes are examples, are deficient in the fermentable constituents needed for palatable silage. On the other hand, a few crops, such as the saccharine sorghums, have so much sugar that unless cut at a more mature stage they have a tendency to produce sour silage.

In most parts of the United States more food material can be obtained from an acre of corn as silage than from an acre of any other crop that can be grown. Corn is more easily harvested and put into the silo than crops like rye, clover, cowpeas, or alfalfa, and when cut for silage the maximum quantity of nutrients is preserved. Experiments have shown that corn, when siloed, lost 15.6 per cent of the dry matter, against 23.8 per cent when cut for fodder and cured in the field. Moreover, there is less waste in feeding silage than in feeding fodder, since good silage properly fed is all consumed. When corn is cut for silage

the land is cleared and left ready for another crop sooner than when the corn is shocked or is husked from the standing stalk. Corn can be put into the silo at a cost not above that of shocking, husking, grinding, and shredding.

Farmers' Bulletin 578 on The Making and Feeding of Silage may be had by addressing the United States Department of Agriculture, Washington, D. C.

### Wipe Fruit to Remove Coating From Late Spraying.

Where fruit growers late in the season have sprayed fruit so heavily as to leave a residue on it, the United States Department of Agriculture urges them to remove the coating by wiping or other means that will make the fruit acceptable in the market. One method recommended for apples and pears which can be followed at a cost of a few cents per box is to wipe the fruit with cotton gloves. It is pointed out that if heavy rainfalls do not occur after heavy late sprayings the coating that remains may disfigure it sufficiently to arouse apprehension in the minds of the consumers, even though the residue may be entirely harmless. In some cases, however, heavy late spraying has been sufficient to be actually injurious, and so subjects such fruits to seizure under State or Federal food and drug laws.

Where apples and pears when harvested show evidence of spray residues which have not been removed in picking, handling, grading, and packing, it is recommended that such fruits be systematically wiped before being placed on the market or packed for shipment. While this precaution is applicable to all fruit sprayed late in the season, it is especially important in the more southern apple districts where the grower is often compelled to spray late to protect the fruit against bitter rot and in irrigated orchards of the West and Northwest where protection of apples and pears against the later broods of the codling moth is secured by spraying with arsenate of lead.

While at this season the department's specialists are laying emphasis on the importance of wiping fruit that has a residue from spraying, they also take occasion to urge that no grower should suppose fruit injury resulting from neglect of proper spraying early in the season can be corrected by belated spraying. Heavy late spraying undertaken in an effort to make up for what should have been done earlier is strongly condemned.

The practice of spraying growing fruit properly marks one of the most important steps in horticultural progress and is responsible to a large extent for the sound, attractive appearance of fruit now on the market, which is in marked contrast to the insect-injured and disease-spotted fruit so prevalent a few years ago.

### REGULATION OF STREAM FLOW IN DELIVERING STORED WATER FROM A STREAM BED RESERVOIR.

By H. H. Johnson, Assistant Engineer, Shoshone Project, Wyoming.

THE word "storage" when used in connection with a stream bed reservoir fundamentally implies stream regulation. Our dams are designed and constructed to conserve all the water possible, within necessary limitations, from the flood flow of perennial streams, and arranged with appurtenant structures to release this water for use at that time when it will be of the most benefit for agricultural purposes. Hence the regulation of the stream flow to properly deliver the impounded water economically and efficiently is a matter of great importance.

During the early stages of the Shoshone project the regulation of the Shoshone River was of minor importance; there was an abundance of water for all purposes, and the Shoshone Dam was looked upon more as an item of interest to the tourist rather than as a tangible benefit to the development of a great community. However, as the project developed and the adjacent communities, also depending upon the Shoshone River for their water supply, grew, the benefits derived from this immense storage reservoir became more and more apparent until at the present time, with less than one-fourth of the project under cultivation, even the most skeptical will admit that without the Shoshone Dam and Reservoir there would be no Shoshone project.

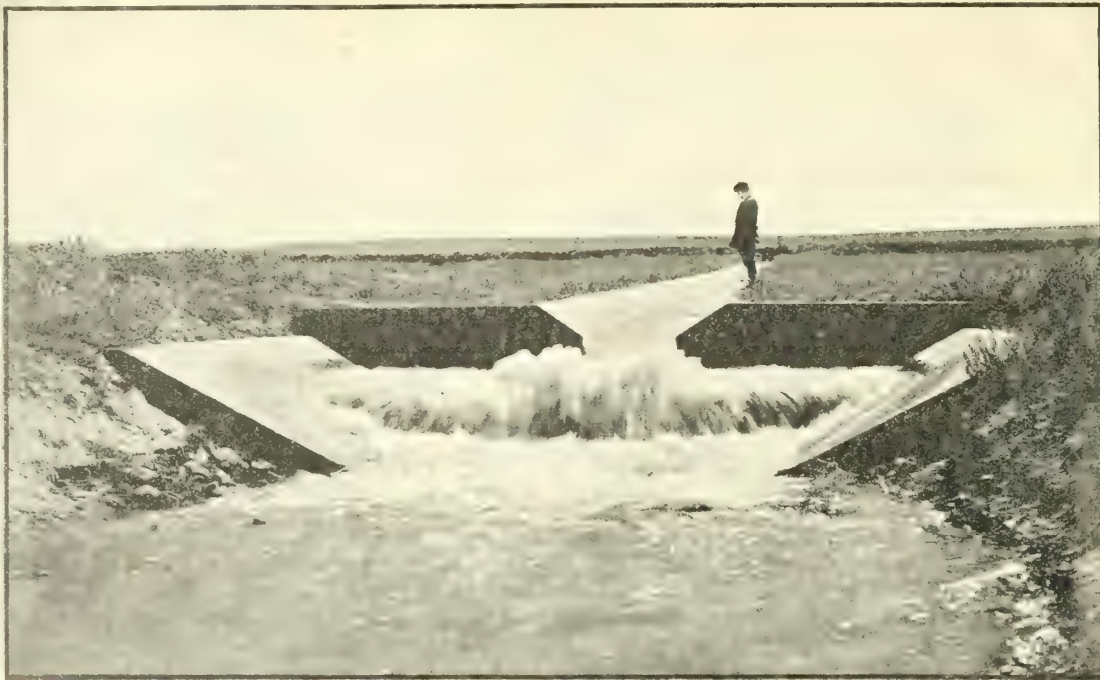
The project is located in the Shoshone River valley, its upper limit being about 80 miles above the confluence of the Shoshone and Big Horn Rivers. There are numerous prior water rights both above and below the project which must be protected and given due consideration in the regulation of the river flow from the Shoshone Reservoir. The principal source of supply is the melting snow from the high altitudes of the Yellowstone Park and adjacent mountainous country, the flow varying from 200 to 20,000 second-feet. The river forks within the Shoshone Reservoir site into two branches of about equal size, the stream beds of both being very steep. The Shoshone Reservoir is only about 75 miles from the headwaters of the river and the drainage area comprises about 1,700 square miles. These geographical features result in a quick run-off and a very short period of peak flow.

The water delivered from the Shoshone Reservoir is conveyed down the river channel for a distance of about 20 miles to the Corbett Dam. Here the portion required for project use is diverted into the canal system and the remainder passed for the use of prior appropriators. The dam is used as a compound weir in measuring the amount of water passed, the formula for discharge having been fairly well established.

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SHOSHONE RESERVOIR WYOMING.

The factors which must be taken into consideration in order to obtain a comprehensive regulation of the stream flow from a reservoir are numerous. Aside from inflow and outflow records, reliable data should be kept relative to the reservoir evaporation and seepage losses. The accretion to flow below the dam site and the return flow from both underground and surface drainage of project lands, which can subsequently be used, should be determined as carefully as possible.

On this project it is possible to obtain all the inflow measurements from two rating stations, one on each fork of the river, any other accretions being so slight as to be disregarded. These stations are located far enough above the high-water contour of the reservoir to be well away from any effects which may be induced by back water, and all the work connected with them is done as carefully as possible in order that the results may be of the most practical value, as the data thus obtained form the basis for control at the dam.

The evaporation and seepage from reservoirs are factors which will vary with local conditions. In both cases, however, the loss must be stood by the reservoir and no portion of it allotted to the lands where appropriations were made previous to the construction of the storage. In the case of a reservoir located as the Shoshone, the climatic conditions which affect evaporation are probably about an average. Even in this case the evaporation is in the neighborhood of 4,000 acre-feet per month during the irrigation season, which means a loss of about 130 acre-feet per day or very nearly 30 per cent of the minimum inflow, which it can be readily seen is a factor not easily laid aside. The actual seepage losses are in most cases more or less indeterminate, but in the case of the Shoshone and other stream-bed reservoirs, whose waters carry considerable silt, it is believed that after several years' operation the loss from this source is negligible. This factor, however, is more of interest from the construction than the operation standpoint.

The important item in the delivery of water from a stream bed reservoir is the determination and the regulation of the quantity within reasonable limits. In the case where the natural river channel is used to convey the water to the project diversion works, as well as the supply for prior appropriations, the quantity is such that the only method applicable to the measurement is the current meter, and the dam site does not offer many desirable locations for a gaging station. Nevertheless, all care possible was taken in choosing the station and an attempt made to obtain results which will compare in accuracy with the inflow measurements.

This project possesses a resource which will result in a material advantage when the ultimate development has been reached and the laws of supply and demand must be more carefully observed than at the

present time, namely, the accretions and return flow to the river below the reservoir site. A short distance below the dam underground streams begin to appear as springs in the river bed. Until the past season no investigations have been made to determine the extent of these springs; but in order to regulate the river flow as was attempted this season, it was necessary to give some consideration to this matter. The only method of obtaining this quantity was by differential measurements above and below the springs, which were undertaken at the rating station below the dam used to determine the reservoir outflow, and at a station maintained about 5 miles below the springs. The results obtained in this way were very consistent and showed an accretion of about 40 cubic feet per second, and it is assumed that this flow is constant throughout the year. This is the only flow entering the river from natural sources within the limits of the project, except, of course, the occasional runoff from local storms, which can not be considered in connection with the stream regulation.

The river traverses about 25 miles of irrigated land, a very small portion of which is above the project diversion, practically all of the project lands draining back to the river. The return flow from underground and surface drainage from these lands, which can be again used for a supply to prior appropriations, therefore, is a considerable amount, and will be of great value to the Service when the project has reached that stage where further development will depend upon additional water supply. The return from surface drainage—that is, the waste from farm lands, canal system, and outflow of subsurface drainage system, of course, can be readily measured. The underground drainage, which appears as seepage along the river bank, is a quantity difficult to determine, and can be obtained only from differential measurements above and below the project lands. The amount of water thus returned, although relatively small in proportion to the total river flow, especially at high-water stages, must be given consideration. Undoubtedly in many cases it will be less than the error, which can be expected from current meter measurements, and results which can be relied upon can only be obtained from a long series of careful observations. The return from these sources varies directly as the amount of water applied to the lands and inversely as the river flow, as the maximum occurs during the peak of the irrigation season, when the demand for water is greatest and the river flow very nearly at its minimum; hence, we obtain the maximum benefit when most needed.

Some of these points may seem trivial when considered as factors affecting the flow of a river. As the project develops, the neighboring communities grow, and the demands for water increase, the necessity arises that all water possible be conserved. Before a comprehensive control of the river can be undertaken, information must be had of all the factors



that contribute to its flow, and we must be prepared to defend any of our acts with reliable data.

It is not intended to convey the idea that we should attempt river regulation with that degree of accuracy which is practiced in a canal system; at its best, regulation can be obtained only within certain limits. Many factors enter over which we have no control, such as river losses, severe storms, etc. It is seldom possible to construct a reservoir to impound all the inflow, and we have therefore at times the condition of spillway discharge, when, of course, regulation is out of our hands. Our appurtenant structures are so designed in many cases as to pass a uniform amount continuously, or, as in the case of the Shoshone Dam, fitted with gates and valves working under high pressure. The smallest practical movement of these gates or valves may mean a change in discharge of from 50 to 100 second-feet. However, it is believed that the methods of control are usually such as to be within the limits of practical regulation when such regulation is necessary.

The benefits to be derived from our ability to regulate river flow were apparent to the settlers lying below the project lands before the project itself considered the necessity. The original diversions for these lands were effected either by cutting canals into the river at places where natural channel conditions made diversion possible or by throwing up crude cribs or wing dams to serve as diversion works. At the time these were constructed there was always ample water to supply the rather slight demands. However, as these communities developed their demands increased, and at the same time the diversion for project use became greater. The result was that many of these old canals could not draw sufficient water from the river to meet requirements, not because of any deficiency in water to supply the appropriation but on account of the stream surface being too low to allow sufficient draft into the canal. Numerous requests were made of the Service in such cases to release water for the use of these settlers. When it became apparent that such requests could not be granted without payment for the water, steps were immediately taken to construct efficient diversion works. The result is that the Shoshone River is being fitted with up-to-date irrigation structures to replace the antiquated types originally used.

Another point which might be mentioned is the automatic regulation effected in the case of a severe storm above the reservoir occurring at the time of a peak flow, which is not unusual. The danger of serious damage resulting to irrigation structures in the stream bed below from an occurrence of this sort is considerably lessened by the intervening reservoir flattening out the peak and distributing the excess run-off over a considerable period of time.

As a concrete example of river regulation the conditions as they existed on the Shoshone project dur-

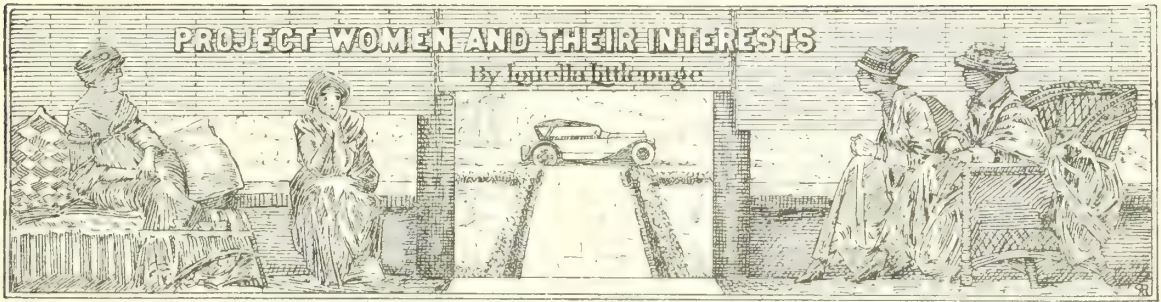
ing the past season may be cited briefly. The prior appropriations below the project amount to about 500 second-feet, which must be supplied if water is available from the natural flow. If the supply is below this requirement, the entire reservoir inflow must be rendered available for these prior appropriators, leaving the project to rely entirely upon stored water. It became apparent early in the season of 1919 that the natural river run-off would be very low. Water passed over the Shoshone Dam spillway but 28 days, reaching a maximum depth of only 1.1 feet; this, combined with the discharge of a 42-inch blow-off pipe near the base of the dam, which is continuous throughout the year, gave a maximum flow of only about 2,000 second-feet. Investigations were immediately undertaken to determine the reservoir inflow and the amount of water which must be discharged over the Corbett Dam. During the time of minimum flow the Cody Canal above the Shoshone Reservoir, diverting from the South Fork of the river, used the entire flow of that stream and only about 10 second-feet reached the reservoir. The North Fork discharged about 215 second-feet. This entire amount, in addition to the increase of 40 second-feet from the springs below the reservoir, or a total of 265 second-feet, had to be delivered to the canals below the project, leaving only storage water for project use.

These investigations were not undertaken at this time with the primary idea of water conservation, as there was still an abundance of water for all purposes. But rather if requests were made for delivery to other than project lands, we would have data at hand for the determination of quantities and also to prepare ourselves for that time when, with the ultimate development of the project, water conservation and efficient delivery will be primary requisites for successful project operation. Negotiations were entered into early in the season for the delivery of Shoshone Reservoir storage water to lands on the lower reaches of the Big Horn River. This would have resulted in the regulation of the flow of two streams and the delivery of this water through about 200 miles of river bed.

When this project has attained its final development and the necessity arises for the conservation of all the water possible, a great advantage will accrue from the fact that the means are at hand to make river operation efficient.

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A handsomely illustrated folder, including a map of the principal highways for the entire State of Oregon, has been issued by the Forest Service. The new publication—"Road and Recreation Map of Oregon"—should prove of immense value to all persons, particularly motorists, seeking recreation in this region endowed with such a variety of natural attractions. Copies of this pamphlet may be obtained by addressing the District Forester, Portland, Oreg.



### Slow Transit.

**T**HE dachshund's eyes are soft and tender,  
And he's so long and slim and slender,  
That when you pat his head on Sunday  
His little tail don't wag till Monday.

Don't smile this off and forget it as a bit of foolish doggerel, but ask yourself seriously how long it takes an impression to galvanize *you* into action.

We all get suggestions daily from the experience of others, through conversation with friends and neighbors, from papers and magazines, and various other sources, which impress us with their advisability or possibilities.

And what do we do about it? If we acquire a constructive suggestion on Sunday and carry it out on Monday we may consider ourself more efficient than the average human being. Why wouldn't it be a good idea to make a card index of these ideas and make a practice of putting them into effect periodically? In that way some of them at least would not be lost. We have in mind a most successful feature writer of this city who always carries a little memorandum book, and it is no unusual sight to see him stop on a crowded street or in the midst of a social gathering and quietly jot down a few mysterious "key words." It is one secret of his success—his faculty of utilizing every suggestion which comes his way.

In this connection there comes to mind a letter just received from a *RECORD* reader, who says that some time ago her club discussed an article in the *RECORD* on hot lunches for school children, decided it was worth trying, and then the war came along and upset everything; that a recent *RECORD* article brought it again to mind; and that they would like to see something more along that line.

As a matter of fact, the article was published in February, 1915, and frequent suggestions have been made since, although probably a majority of the project schools are now serving more or less elaborate hot lunches and have more than a theoretical knowledge of their efficacy.

It is encouraging to feel that even one of the project clubs has been inspired by the *RECORD* to inaugurate a progressive movement, even though it takes five years to really "soak in."

### THE SCHOOL LUNCH.

It is now a generally accepted fact that a child's mental condition depends largely upon his physical condition, so that progress in school requires a consideration of factors which in the past have not received their due share of attention. It is as much the duty of school authorities to make thoughtful provision for the physical well-being of a child as it is to provide a proper schoolhouse, an intelligent teacher, up-to-date textbooks, or any of the other educational needs. The long, sometimes extremely cold winters in many sections of the West and the great distance some pupils live from the schools make the noonday lunch one of the most vital problems to be considered by all who are interested in the best all-round development of our boys and girls. This problem can only be solved by the cooperation of the home and school authorities.

Intelligent mothers no longer fill the lunch baskets with anything that happens to be left from the family meals. The hot school lunch has passed the experimental stage. The plan has proved its feasibility and value under so many and such trying circumstances that its advocates now feel it will succeed even under the most adverse conditions. The interest and enthusiasm of both teacher and parents are the largest determining factors.

*Food requirements of school children.*—In common with the adult, the child needs food material sufficient to maintain body temperature, furnish energy, repair wastes, and maintain body fluids. But in addition the child requires an excess in order to meet the needs of growth. Therefore, in order to get the proper balance, the entire supply of food for the day should be planned at one time.

In most country homes the noon meal is the main meal; the breakfast (at least for the child) is light and hastily eaten, while the evening meal is a moderate one. As the child must miss the main meal at home, the meal from which a large portion of the food supply is obtained, the problem of the school lunch deserves serious consideration.

*Preparation.*—The lunch should be satisfying and nutritious but not heavy, for a heavy lunch causes



mental sluggishness. Much better work is done by the children and they are happier and more easily controlled after a well-balanced hot lunch. Each lunch should contain:

1. A large portion of plain, nutritious, and mild-flavored food, chiefly sandwiches.
2. A succulent food, as fresh fruit, fruit sauce, fresh tomatoes, light salads, celery, lettuce, etc.
3. A sweet, such as homemade candy, cookies, simple cake, cup custards, puddings, preserves, etc.
4. One hot dish, such as soup, cocoa, etc.

The lunch at school should not be a perfunctory matter. It is not just a question of providing desirable food, but a means of teaching boys and girls to eat in the right way the foods that are good for them.

Through the school lunch the teacher may work very closely with the homes of the community and should know something of home conditions. Common errors in the feeding of children are frequently revealed in even the best families when teachers work in cooperation with the mothers.

1. The children may not be drinking their pint of milk a day.
2. Some children come breakfastless to school.
3. The breakfast cereal may not be receiving its share of attention.
4. The diet may be lacking in vegetables.
5. Children may be eating too much meat and pastry and may be drinking tea and coffee.

Foreign-born families may not understand how to adapt their national food habits to American conditions.

Probably the most difficult thing to deal with is to persuade children to eat and like the foods which are best for them. Through mistaken kindness, or carelessness on the part of mothers, they acquire likes and dislikes which become so firmly established with them that they seem at times impossible to change. It is therefore most important that the foods served at school should be appetizing and attractive. In order to tempt the children to acquire a taste for vegetables it is necessary at times to resort to camouflage. The taste is more easily acquired through the use of full-flavored cream soups and purées than through the use of vegetables in their more obvious forms. As stated above, a friendly cooperation with the parents should be carried on, as children must be impressed with the importance of eating the same types of foods at home.

Hot dishes prepared at the school are intended to supplement but not supplant the lunch brought from home. The list of dishes for a given period should be planned and announced so that the home lunch may not duplicate it.

In order to make a success of the venture it is advisable to begin in a very modest way so as not to require too much time and energy. Simple equipment will also serve for a beginning and may be

donated by the parents or purchased for a very small sum. Whenever possible the school board should furnish the equipment, and a donation party to furnish supplies is admirable, furnishing much merriment and arousing general interest. Some times farmers' or community clubs will gladly aid in equipping the school, as such equipment would then be available for use at their meetings.

*Utensils.*—An oil stove is quite satisfactory; a cupboard may be made from packing boxes, and for a table a couple of wide drop shelves be used. Of utensils there should be 1 large kettle, 1 slightly smaller kettle or a double boiler, 1 each cooking spoon, tablespoon, teaspoon, fork, measuring cup, paring knife, 2 dishpans, 5 dish cloths, 8 dish towels, and if possible 1 fireless cooker, which may be homemade.

*Supplies.*—There should be kept on hand a small tightly covered can of flour, a small tightly covered can of sugar, salt, pepper, and a can of cocoa.

*Personal equipment.*—Each student should furnish for his own use a knife, fork, spoon, large cup and saucer, and a plate, and these can be kept with the general equipment.

*Dishes which may be served.*—1. Beverages: Cocoa, instant postum.

2. Soups: Cream of vegetable, as corn potatoes, peas, beans, meat, tomato, etc.

3. Chowders; Potato, corn, fish.

4. Plain boiled vegetables with seasoning.

5. Creamed vegetables.

6. Cereals, cooked in a fireless cooker.

7. Stews: Meat, vegetables, or combinations.

8. Escallops and baked dishes if there is an oven. Potatoes may often be roasted in the ash pan.

In case the opportunities for cooking at the school are very limited, the mothers often agree to provide for one day out of the week by taking turns in sending a dish either in the fireless cooker or one that may easily be reheated at school, as baked beans, macaroni and cheese, escalloped potatoes, tomatoes, or corn, etc. In an average-size school no mother would have to send more frequently than once in two or three months. Thus the school need plan for only four days a week.

(Continued in November RECORD.)

### Use This in School Lunches.

In the districts where hot lunches are not yet served to school children the invention of a little Alabama girl is interesting. Her wits, sharpened by membership in a boys' and girls' club, an article in the patent inside of the little local newspaper left her in a thoughtful mood. It set forth the physical advantages of a hot dish for the kiddies' luncheon. Club contests had left her an undefined consciousness of the value of the best possible mental equipment, and

instantly she decided that if a hot drink of cocoa or soup at the noon hour was beneficial it must be had.

There was no money in the little home to spare for thermos bottles, so she needs must construct one herself. A salad oil bottle packed around tightly with excelsior in an oatmeal carton did the trick, and 13 cents' worth of oilcloth for a cover made a neat package to carry.

And then the neighbors wanted to copy her invention, so experiments were made, which showed that sawdust, hay, paper pulp, and similar materials might be used instead of excelsior, which is sometimes unavailable in the country.

The bottle was a success from every standpoint, the very thing for children to carry to school and not break, and under various tests it was found that it would maintain the heat in the liquid for four and one-half hours.

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### Read This.

Mrs. George A. Steele, residing at Fernley, on the Newlands project, Nevada, has written an interesting account of how the Fernley Club built its hall, for the benefit of those communities which may have a similar enterprise under consideration.

#### How the Fernley Improvement Club Built its Hall.

Fernley is located in the western part of the Newlands irrigation project (formerly the Truckee-Carson project), Lyon County, Nev. The Improvement Club was organized in 1910, with about a dozen members. Our community was a small settlement of about 40 homesteaders, and some of these lone bachelors—all pioneering on the Great American Desert trying to make homes.

The women decided that there must be a place to meet; the schoolhouse was small and the homes smaller, so the idea of a clubhouse grew. Money was raised in various ways; entertainments, donations, etc., all helped swell the treasury. When the magnificent sum of \$700 was raised the clubhouse was started. As the building was to cost about \$1,200, we were able to borrow money from the bank on a note signed by several landowners.

Our building is 35 feet wide and 70 feet long. It is furnished with a piano and comfortable seats, with dishes enough to serve 80 people, and electric lights.

The building is a community center, the use of which is free to all public gatherings of general interest. The Mothers' Club, Farm Bureau, Red Cross, Water Users' Association, all feel that the hall is for their use. The club meetings are held in the hall. For all private affairs there is a rental charge, and with this fund improvements are made and the depreciation taken care of.

The valley is proud of its community center built by the efforts of the women and turned over by them to the community. If any other club intends building, they should understand that it takes lots of effort and untiring work, but it is worth it.

The dues of the Improvement Club are \$1 a year; its present membership 32. It became affiliated with the State federation in 1915.

This spring we planted two trees in honor of our two boys who did not return from France.

The club is now corresponding with the faculty of the extension work in agriculture and home economics of the University of Nevada for a lecture each month.

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### You'll Want This.

The Department of Agriculture, Washington, D. C., has just issued a pamphlet on Home Laundering which every housekeeper may and should have, because clean clothes are as necessary as clean food to health and comfort and because it tells how to overcome to a great extent much of the drudgery connected with this occupation.

Washing and ironing are among the hardest of the regular household tasks and ways of lessening the work are much needed in many homes. The ideal of every housekeeper would be a separate room for her laundry, with running water and modern labor-saving devices. These can not be provided in many homes, but even where the arrangement and equipment are necessarily very simple it is often possible to make minor changes or to plan the work in such a way that it will take less time and strength. Probably not many households could adopt all the conveniences and methods described in the bulletin mentioned, but if the housekeeper follows the suggestion as far as her resources and circumstances permit she will be able to make the weekly washing less burdensome.

The book treats in detail the construction of the laundry room, its equipment, supplies, and methods of handling different materials, colored fabrics, cleaning and pressing, and proper laundering.

Write to the Department of Agriculture, Washington, D. C., and ask for Farmers' Bulletin 1099. Home Laundering. It is free.

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### Haughty Yakimans!

No wonder the women on the Yakima project, Washington, are "putting on airs." Five valley club women have been given appointments as chairmen of different standing committees of the State Federation of Women's Clubs, the action being taken by the federation executive committee at its special meeting in Seattle.



Mrs. J. V. Ellis, jr., who has long been interested in the study of bird life, and who spoke at the 1920 State federation of the work to be done to conserve bird life, is named chairman of the committee on bird life.

Mrs. Ira D. Cardiff heads the literature committee.

Mrs. O. K. Williamson, of Prosser, who has long been active in federation circles, is chairman of the civics committee.

Mrs. R. C. McCredie, of Sunnyside, heads the public health committee.

Mrs. David Murray, of Ellensburg, was again selected chairman of the federation pin committee.

### Can the American Way.

The fact that in 1918, at a time when it was so necessary that nothing be wasted, the housewives and club girls in America were able to conserve nearly a billion jars of food has made a deep impression on people in other lands, who are now anxious to learn how it was done. Last year France borrowed three canning specialists from our Government to teach agricultural directors and professors in the French Agricultural College our methods of canning and drying. This year short courses were conducted all through the country, and other European countries have asked for aid.

Our method of cooking the fruits and vegetables in the jar is spreading through all civilized countries. The school held in France last year was attended also by Algerians, Syrians, Armenians, and Egyptians, who have since been teaching it in their respective countries. Holland's Health and Nutrition Department, recognizing the value of plenty of fruits and vegetables in the diet of a people all the year round, has asked for lectures and demonstrations by the Americans. Denmark has called home her agricultural consuls this summer from all parts of the world for two weeks' instruction in food conservation, and Belgium and England also have requested the loan of canning specialists.

Do we appreciate our advantages?

### Miss Mabel Wilson.

It was with deep regret that we just read of the death of Miss Mabel Wilson, of the Carlsbad project.

Since the RECLAMATION RECORD inaugurated the Women's Department in 1914, Mabel Wilson has been our friend. Her letters, sometimes transmitting an article for publication, and sometimes to express her appreciation for some article or offer a suggestion, have been bright spots in our official life. She was so friendly, so appreciative, so willing to help. The letter telling of her departure said:

"On the morning of the 22d of August, surrounded by relatives and friends, her casket covered with beautiful flowers, we committed her frail body to Mother Earth to await the resurrection morn. Although a lifelong invalid, Mabel was very much interested in everything making for the betterment of her neighborhood and the Carlsbad project. Her last article for the press, written just before her illness, was an appeal for a rest room for the project women when shopping in Carlsbad."

We are sure that thousands of project women who have read her helpful articles will extend their silent sympathy to the family and the community where she wrought so well.

### Reclamation Record Cook Book.

#### FRUIT PUDDING.

By Morris Bien, Assistant Director United States Reclamation Service. (Mr. Bien's favorite.)

A delightful dessert, suitable for any time of year. Considered as a delicacy by all who taste it.

#### *Pudding.*

2 cups flour.	$\frac{1}{2}$ cup sugar.
1 heaping teaspoonful baking powder.	$\frac{3}{4}$ cup sweet milk.
$\frac{1}{2}$ teaspoonful salt.	1 egg.
	1 tablespoonful melted butter.

Mix as you would a cake. Place in a well-buttered pudding mold or narrow tin and steam one hour.

#### *Sauce.*

One-fourth cup soft butter creamed with three-fourths cup sugar to velvet consistency.

One quart fresh fruit (strawberry, red raspberry, finely cut peaches, or ground pineapple; the pineapple may be either fresh or canned).

Mix up gently, but thoroughly, the creamed butter and sugar with the quart of fruit. Cut the steamed pudding in slices, spread the fruit and sauce mixture on the slices while hot, and serve.

#### CARROTS AU GRATIN.

By Miss Elizabeth Conway, Rio Grande project, New Mexico-Texas.

6 medium-sized young carrots.	$\frac{1}{2}$ cup grated cheese.
2 tablespoonfuls butter.	$\frac{1}{2}$ teaspoonful salt and dash of pepper.
2 tablespoonfuls flour.	

Wash, scrape, and dice carrots.

Cover with boiling salted water and cook 20 minutes, or until nearly done. Drain, saving the liquid in which the carrots were cooked.

Melt 2 tablespoonfuls of butter, add the flour, and when it cooks up smooth add gradually one cup of the liquid.

Boil a few minutes, until thickened, then add grated cheese, salt and pepper, and carrot cubes.

Mix well together, pour into a buttered baking dish, cover the top with buttered crumbs, and bake until well heated through and brown on top.

## COLD SLAW.

By Miss Sallie A. B. Coe, Settlement Section, Washington Office.

Cut cabbage fine with slaw cutter.

*Dressing.*—Mix to smooth paste 1 teaspoonful mustard and 1 teaspoonful flour. To a beaten egg add  $\frac{1}{2}$  cup of water and  $\frac{1}{2}$  cup vinegar, lump butter, and teaspoonful salt.

Mix in mustard and flour and boil until it thickens (consistency of gravy). Then add heaping tablespoonful sugar.

## DATE LOAF.

By Miss Margaret E. Flanagan, Stenographic Section, Washington Office.

Place 1 cup of milk and 3 cups of sugar over the fire and let it come to a boil; then add 1 pound of seeded dates. Stir continually until it becomes thick enough to form a ball in cold water. Then remove from stove and add 2 cups of nut meats (pecans preferred) and beat until it begins to thicken.

Wet a huck towel in cold water and wring it as dry as possible; pour candy on it and roll it up. When the towel is dry remove and slice loaf as you do cake.

## CREAM OF ONION SOUP.

By "A. J. B.," Huntley Project, Montana.

2 tablespoonfuls flour. 4 medium-sized onions.  
3 cups cold milk. 1 tablespoonful butter.

Slice onions and cook in boiling water until soft, changing the water once during the cooking. When tender, rub the onions through a sieve and to a cupful of the pulp prepare the following:

Melt a tablespoonful butter, and when hot and bubbling add flour. Stir until mixture leaves the sides of the pan. Add the cold milk and cook until smooth; after 10 minutes of cooking add the onion pulp and cup of liquid in which they were cooked. Boil up once, season with salt and pepper, and serve.

## CREAM OF POTATO SOUP.

By Mrs. E. W. Ballard, Legal Section, Washington office.

One of the most delicious of soups is made from potatoes. Take 3 medium-sized potatoes, 1 onion, 1 stick of celery or dash of celery salt, 1 cup milk, 2 cups of water, 2 tablespoonfuls butter, salt and pepper, and 2 ounces of tapioca. Cut up vegetables and put in saucepan with the butter. Cook for 10 minutes, then add milk and water and boil for 1 hour, or until mixture is soft enough to rub through sieve. Boil again, adding a little more milk, if necessary, sprinkle in tapioca, season, and serve with French rolls.

## FRENCH ROLLS.

Rub 4 tablespoonfuls butter and a saltspoon salt into 4 cups flour; mix yeast cake with half cup of tepid milk or water, add to the flour, and work it into a light dough. Cover with cloth and stand it in warm place for  $1\frac{1}{2}$  hours. Then turn out on board, cut and roll, put in slightly floured baking pan, and bake in moderate oven for 20 minutes.

## POP OVERS.

By Frank Carpenter, former clerk on the Newlands project, Nevada.

1 egg. 1 cup sweet milk.  
1 cup sifted flour. Pinch salt.

Beat the egg well, and then some more, then beat in other ingredients, put quickly into hot, greased, small muffin tins and bake about 40 minutes in moderate oven.

## SALAD DRESSING.

By Miss Bessie Burwell, Drafting Division, Washington Office.

2 eggs beaten well together. 1 soup spoon mustard.  
2 cups sugar. 1 teaspoon black pepper.  
3 cups vinegar. 1 lump butter size of an egg.  
1 soup spoon salt. Celery seed to taste.

Boil until egg is done, stirring constantly. Fine for slaw, over lettuce, etc.

## HOLLANDAISE SAUCE.

By Miss Jessie Smith, Salt River project, Arizona.

Melt in double boiler 3 tablespoonfuls butter, add 2 tablespoonfuls flour. When well blended add gradually 1 cup hot water and stir until thickened.

When very smooth add  $\frac{1}{2}$  teaspoonful salt, dash cayenne pepper, and 1 tablespoonful lemon juice. Leave sauce in double boiler until ready to serve, then pour over well-beaten yolk of 2 eggs and cook up quickly.

Fine this way over baked or boiled white-fleshed fish—halibut, flounder, cod, etc.

When chilled, splendid over asparagus salad.

Good hot over deviled eggs or eggs on toast.

—L. L.

## CHANGE OF ADDRESS.

Water users receiving the RECLAMATION RECORD who wish to notify the Washington office of a change of address should state that they are water users and also give the name of the project on which they are located. If this is not done, it will be necessary for this office to write to such water users for the desired information before the name can be located on the mailing list and the proper change made. Help us and help yourselves by giving us this information in your first letter, and we will do our best to see that the change is made and that the RECORD is sent to your new address without unnecessary delay.

Never before has there been such opportunity as at present for the United States to occupy an important place in world commerce, particularly with regard to food supplies.



# COMMITTEE ON APPROPRIATIONS INSPECTS PROJECTS.

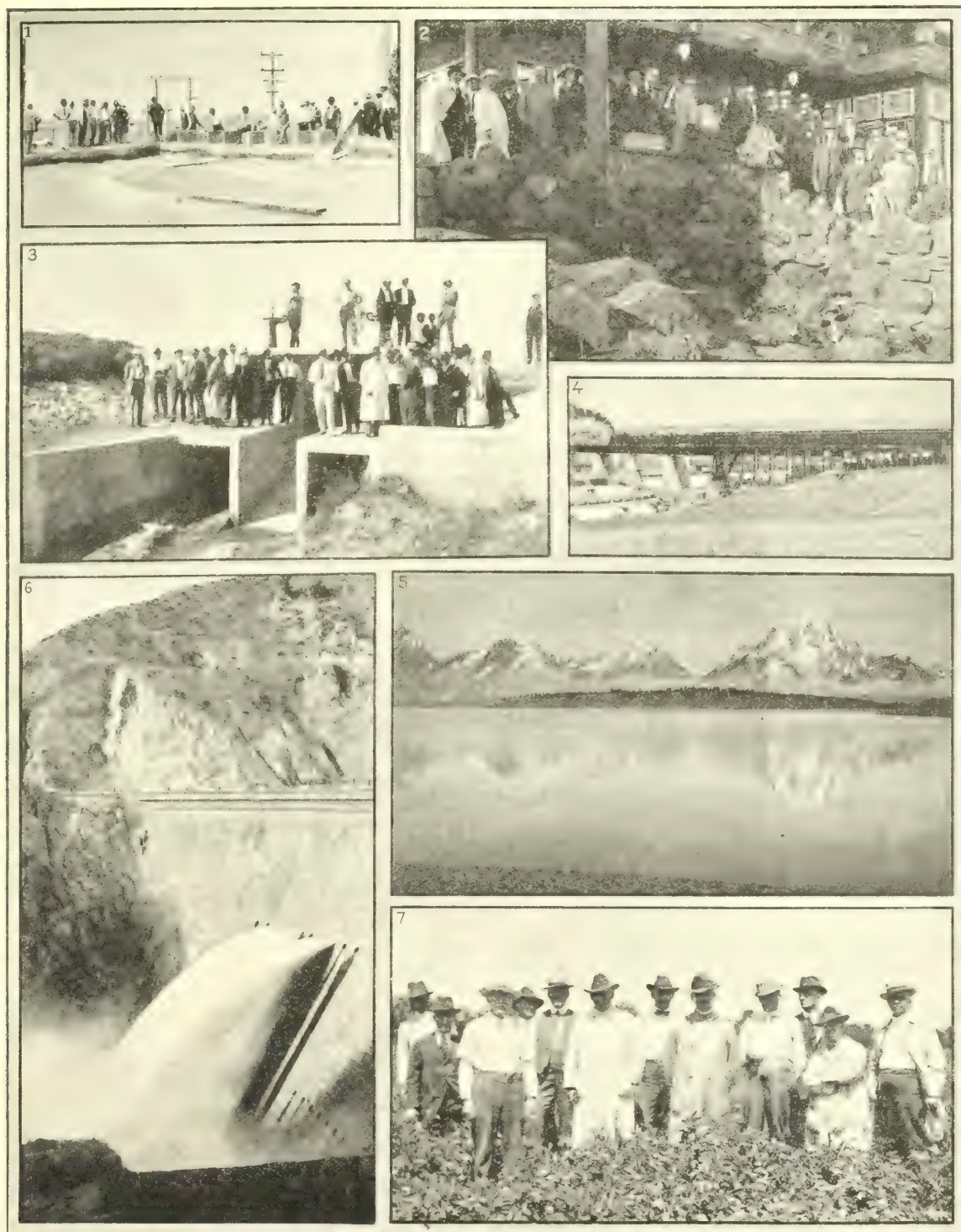
THE House of Representatives has one great committee that is essentially nonpolitical. It is the business committee. It controls the national purse strings. Its relation to the Reclamation Service is somewhat like that of a board of directors to a large corporation. Assignment to the Committee on Appropriations means little glamour and much hard work.

When Congress adjourned early this summer, the committee completed a period of almost continuous labor extending back several years through the war Congress. It is an election year. Every Member's term expires this fall. The natural inclination was to hurry home to the political arena. The committee, however, decided to send a delegation of its members for a 40-day trip through the West to inspect the reclamation projects and national parks for which it is called on to appropriate funds.

Date.	Points visited.	Railroads.	Mileage.	
			Rail-road.	Auto and boat.
June 20	Chicago, Ill.			
22	Denver, Colo.	C. & N. W.; U. P.	1,047	
22-23	Rocky Mountain Park			200
23	Denver, Colo.			
21	North Platte project, Nebr.-Wyo.	C. B. & Q.	202	80
25	Ogden, Utah	C. B. & Q.; C. & S. U. P.	663	20
26	Newlands project, Nev.	S. P.	510	50
26	Reno, Nev.	do.	40	30
27-8	San Francisco, Calif.	do.	239	98
29-2	Yosemite Park	do.	148	160
July 2	Hetch Hetchy	H. H.; Sierra; S. F.	9	54
3-5	San Francisco, Calif.	S. P.	185	100
6	Orland project, Calif.	S. P.	74	30
7	Iron Canyon			32
6	Klamath project, Oreg.-Calif.	S. P.	211	70
7-9	Crater Lake			70
9-11	Deschutes Valley			245
11	Columbia River Highway	O. W. R. & N.	174	20
11	Portland, Oreg.			40
12	Tacoma, Wash.	O. W. R. & N.	145	
12-13	Mount Rainier Park			75
13	Tacoma, Wash.			75
13	Seattle, Wash.			40
14-15	Yakima project, Wash.	N. P.; O. W. R. & N.	205	150
16	Umatilla project, Oreg.	O. W. R. & N.	102	28
16	Pendleton, Oreg.	do.	27	20
17	Boise project, Idaho	O. W. R. & N.; O. S. L.; Intermt.	296	67
18	Minidoka project, Idaho	O. S. L.	314	68
18	American Falls, Idaho	do.	33	
18-19	Idaho Falls, Idaho	do.	76	
19-23	Yellowstone Park	do.	108	360
23-24	Shoshone project, Wyo.	C. B. & Q.	22	73
25	Huntley project, Mont.	do.	117	29
26	Sun River project, Mont.	do.	295	53
27-28	Glacier Park	G. N.	173	124
29	Milk River project, Mont.	do.	263	39
30	St. Paul, Minn.	do.	832	20
31	Chicago, Ill.	C. B. & Q.	431	
			6,941	2,520

It was not an easy-going trip. The party traveled nearly 10,000 miles, mostly at night. Commonly arriving at a new project early in the morning, the committee spent the day inspecting the Government works and project agriculture, reboarding its rail-

Date.	Point.	Joined party.	Left party.
June 20	Chicago	J. W. Byrns, L. C. Cramton, J. J. Eagan, J. M. Evans, J. A. Gallivan, M. W. Shreve, W. R. Wood, N. J. Sinnott, A. B. Cammerer, J. B. Beadle, A. K. Barta, J. A. Gallivan, Jr.	
21	Cedar Rapids, Iowa	J. W. Good.	
22	Denver	C. B. Timberlake.	
23	Estes Park		C. B. Timberlake.
23	Denver		A. B. Cammerer.
23	Sterling, Colo.	C. B. Timberlake.	
24	Bridgeport, Nebr.	M. P. Kinkaid, F. E. Weymouth.	
24	Morrill		M. P. Kinkaid.
24	Cheyenne	S. T. Mather.	
25	Green River, Wyo.	B. Dibble, F. W. Brown, D. S. Spencer.	
25	Ogden		B. Dibble, F. W. Brown, D. S. Spencer.
26	Fallon, Nev.	A. P. Davis, C. B. Henderson.	
26	Hazen		A. P. Davis, F. E. Weymouth.
27	San Francisco		C. B. Henderson, M. W. Shreve.
28	Oakland	B. L. French.	J. J. Eagan.
29	Merced		J. A. Gallivan, J. A. Gallivan, Jr.
July 1	Yosemite		J. W. Byrns.
5	San Francisco	J. W. Byrns, A. P. Davis.	
6	Orland	Wm. Kent, C. F. Lea.	
6	Red Bluff		Wm. Kent, C. F. Lea.
8	Crater Lake	J. J. Eagan.	
9	Bend		S. T. Mather.
11	Portland	E. D. Baldwin.	
13	Seattle	S. T. Mather.	
13	Seattle	W. L. Jones, J. W. Summers.	
14	Ellensburg	A. P. Davis.	
14	Yakima	B. E. Stoutemyer.	
15	Sunnyside		W. L. Jones, J. W. Summers, B. E. Stoutemyer.
16	Umatilla		
17	Parma, Idaho	A. T. Smith, B. E. Stoutemyer, F. E. Weymouth.	
18	Twin Falls	B. Dibble, F. A. Banks.	
18	Pocatello		C. B. Timberlake, A. T. Smith.
18	Idaho Falls		A. P. Davis, F. E. Weymouth, B. E. Stoutemyer, B. Dibble, F. A. Banks.
19	Canyon Hotel	J. F. Byrnes.	
22	Lake Hotel	F. W. Mondell, A. P. Davis, F. E. Weymouth.	
24	Billings		F. W. Mondell, N. J. Sinnott.
25	Ballantine		F. E. Weymouth.
26	Great Falls	C. P. Williams, J. L. Savage, Scott Leavitt.	A. P. Davis.
27-28	Glacier Park	R. M. Snell.	J. L. Savage, R. M. Snell, Scott Leavitt.
29	Glasgow		B. L. French, J. M. Evans, C. P. Williams.
31	Chicago	J. W. Good, J. W. Byrns, J. F. Byrnes, W. R. Wood, J. J. Eagan, L. C. Cramton, J. B. Beadle, A. K. Barta.	



1. Minidoka project. At discharge into canal from irrigation pumping station No. 2; 640 second-feet capacity. 2. At Garrison Home, Lava Hill, Yakima. 3. Milk River project. At wasteway from main canal to Bowdoin Lake. 4. American Falls, Idaho. Site of proposed American Falls Dam and Reservoir. Party (on right bank) has left special train (on bridge) for view of damsite, just above bridge. 5. Jackson Lake Reservoir and the Grand Tetons. 6. Arrowrock Dam, Boise River, Idaho. At time of congressional visit, July 17, 1920. 7. In irrigated potato field, Boise project. Left to right: Congressmen E. L. French and J. J. Eagan, Dr. John Pipher, Nampa, Idaho, Chief Engineer F. E. Weymouth, Congressmen C. B. Timberlake, J. M. Evans, J. W. Byrns, J. W. Good, and W. R. Wood, Director A. P. Davis, Congressmen L. C. Cramton and A. T. Smith.



road car late in the evening for another night of travel. Twelve reclamation projects in operation and six national parks were visited, also a number of proposed developments and other points of interest.

Ten members of the Appropriations Committee took the trip in whole or part, including Hon. James W. Good, chairman, and Hon. Joseph W. Byrns, ranking minority member, both of whom are members of the subcommittee that first considers appropriations from the reclamation fund. The party also included Chairman Sinnott, of the Public Lands Committee, which deals with many matters affecting reclamation projects and other western subjects, also Congressman Timberlake, of the Ways and Means Committee. Director Davis, of the Reclamation Service, and Director Mather, of the Park Service, were with the party for most of their respective fields of work, as well as other representatives of the two Services. At the various stops the party was met by many local people representing the water users, chambers of commerce, and other bodies that contributed generously of their time and means to make the trip a success. A number of Senators and Representatives joined the party for the parts of the trip in their States or districts. At each reclamation project or national park the project manager or park superintendent met the party and largely directed the local program.

The railroads vied with each other in advancing the purpose and convenience of the party. One or more representatives of the particular line in use was always on hand, and frequently a special car was added to the train with high railroad officials accompanying the party. Frequently a special engine was furnished, expediting the program a day or greatly facilitating inspection. The tabulation below gives some idea of the help received from the railroads, but it is impossible to show in this way their tremendous assistance in making the trip a success or the unfailing courtesy and zeal of all the railroad representatives in aiding the party.—*J. B. B.*

## METHODS OF BUILDING CLOSED DRAINS.

### To Secure Stability Against Settlement, After Construction, In Sand And Loam Soils Saturated With Water.

By **A. R. McGinness**, Assistant Engineer, United States Reclamation Service, Huntley Project, Montana.

ONE of the very important features, if not the most important, in connection with drainage on the Huntley project is the construction of drains in quicksand, sand loam, and similar materials saturated with water so that they will remain in place, preserve their original alignment, and give the service for which they were constructed.

The first trouble experienced on the Huntley project with this class of material was in 1914 in the construction of drain No. 12. This drain is 6,953 feet long, and practically the entire drain is laid in sand loam, quicksand, or clay material. Practically no gravel was encountered up to station 58+00, and even here it was not of good quality or in large quantities. The slope of the drain where the greater part of the trouble has been experienced is 0.002.

During construction a stiff clay seemed to be the predominating material up to station 30+00; for about 3,000 feet beyond this point the top soil was a heavy gumbo, exceedingly hard, but underlain with quicksand, so that after the trench was opened by the trenching machine and sheeted the sand flowed continuously into the trench, and it was necessary to remove it with buckets. Thus the banks on either side were undermined and the 6 feet of gumbo was held in place only by the bracing. These banks usually cracked from 4 to 8 feet back from the trench and gradually settled down, placing great pressure on the sheeting and making the work very dangerous. At about station 38+00 work was suspended temporarily, as the tile had become clogged with sand and it was

(Continued on page 475.)

### Special assistance rendered by railroads.

Road.	From—	To—	Special aid.	Railroad representatives accompanying party.
C. & N. W.	Chicago.	Omaha.		H. H. Hunkins.
U. P.	Omaha.	Denver.	Special car.	F. W. Robinson, W. S. Basinger.
C. B. & Q.	Denver.	Wendover.	Special car from Brush. Special stop at Whalen Dam.	J. F. Vallery, M. Leary.
U. P.	Cheyenne.	Ogden.		S. G. Meder.
S. P.	Ogden.	Seattle.	Special car.	E. O. McCormick, S. T. Dolan.
	Dunsmuir.	Klamath Falls.	Special train.	
	Madras.	Multnomah Falls.	Special car.	W. S. McMurray, H. S. Lounsbury, H. W. Hicks.
O. W. R. & N.	Yakima.	Umatilla.	Special train; special stops.	J. Cary.
N. P.	Seattle.	Yakima.		D. S. Spencer and others.
O. S. L.	Nampa.	Idaho Falls.	Special train.	
C. B. & Q.	Cody.	Ballantine.	do.	G. W. Holdredge and others.
		Billings.	do.	J. H. Carroll, T. C. Wear, H. C. Leedy, J. F. Beckett.
G. N.	Billings.	Fort Shaw.	do.	J. H. Carroll, H. C. Leedy.
	Great Falls.	Great Falls.	Special cars.	
		St. Paul.		

necessary to go back about 1,000 feet and take measures to open it up. In doing the repair work the tile was uncovered at several points, and in every instance was found to have settled vertically varying depths. It was then decided that the original plan of construction was at fault, and accordingly in the repair work or reconstruction substantial ladders replaced those of lighter design and large quantities of gravel were hauled and placed under and around the tile.

The reconstruction was completed and the entire drain finally built, using what was at that time supposed to be good construction methods. Notwithstanding this, the drain has always given a great deal of trouble, and each year has required the expenditure of considerable sums to keep it in successful operation. The major portion of the expenditure has been used in repairing breaks where tile settlement had occurred in quicksand or other unstable soil. Even the stiffer clays seem to disintegrate and become unstable, thus producing the same conditions that obtained in quicksand.

Drain No. 26, which is 4,156 feet long with a slope of 0.0025, serves as another illustration of a condition typical of the trouble encountered on drain No. 12 and on drains constructed on several other reclamation and private drainage districts.

This tile drain was constructed during the spring and summer of 1917 and backfilled in the spring of 1918. In the construction of the drain substantial cradles 16 feet long and made of 4 by 4 inch timbers and 1 by 6 inch crossties 6 inches apart were used for the entire length of the drain. Quantities of large rock and gravel were rammed into the subgrade and the tile covered to a depth of 4 or 5 inches with good gravel. Approximately 16 cubic yards of gravel to the station were used in the worst places.

The drain gave good results and operated satisfactorily until March or April, 1919, when two or three breaks occurred in the line owing to tile settlement. These were repaired, and the drain was in successful operation until August, at which time about 1,200 feet of the drain began to settle and the drain became entirely clogged. Some repair work was attempted, but conditions became worse so fast that it was deemed inadvisable to continue.

This settlement seems to occur gradually, and apparently is caused by infiltration of sand from under the tile into the drain, whence it is washed into the trap boxes. The first settlement is possibly very small, and the tile joint is only slightly opened, but as variation from grade becomes more pronounced the larger the joint opening becomes and the more rapidly the settlement proceeds. Instances have been noted where this vertical settlement has been as great as 6 feet and equal to four or five times the diameter of the tile. Trap boxes with bottoms have settled as much as 2 or 3 feet in some cases.

Mr. A. H. Ayers, former project manager, Shoshone project, reports that similar difficulties have occurred in several instances on that project. In those cases of failure, however, the maximum length of settlement has not exceeded 200 feet.

On the Shoshone project one such failure occurred five years after construction and another three weeks after construction. In all these cases no special precautions had been taken, such as placing heavy ladders or surrounding the tile with gravel. Wherever failure has occurred in quicksand material, some broken tile have been found and settlement has taken place. It is believed that this is true also of practically all failures on the Huntley project, although in a few cases the tile has never been recovered and in a few the tile removed were all sound. Whether the tile were broken before settlement or after displacement it is hard to determine, though the indications are that the tile were broken during the process of settlement.

Interesting information from the North Platte project, where a great deal of trouble with tile drains similar to that on the Huntley and Shoshone projects is reported, reveals practically the same class of material with the same conditions obtaining. It has been necessary to construct portions of these drains as many as three times.

The first time some of these drains were built the material was dry; as soon as the ground became wet the tile began to settle out of line and soon the drain became plugged and was put out of commission. The second time these drains were built they were laid on cradles similar to the ones used on the Huntley project, but no gravel was applied, the cradles simply being laid on a firm base. This, however, proved unsuccessful, coinciding with experience on the Huntley project.

The third time these drains were replaced piling was driven to refusal at intervals of 3 or 4 feet. In addition to the cradles and their supports, gravel was placed around and especially under the tile. So far there has been no trouble with tile lines thus constructed, provided the piles and supporting posts were placed at close enough intervals.

A very important condition should be noted on the North Platte project, however, namely, that they have found it impossible to construct drains through some of these places after the water table has risen 2 or 3 feet above the grade line, except by building open drag-line ditches and then resorting to all manner of vertical and horizontal sheet piling, providing for upward as well as downward pressure on the tile in order to hold them in place. It follows that this kind of work is seldom done except for very short stretches and when driven to it by the utmost necessity. Otherwise these drains are built during the early spring when the water table is down below grade. If such



conditions are not obtainable, then open drains constitute the only resort.

On the Huntley project, after the water table has once risen to a point where crops are endangered, it seldom recedes below any desirable grade line, therefore for our difficulties open drains would appear to be the solution, but these are impracticable on this project from both a construction and a maintenance standpoint, and also because the small farm units make open drains very undesirable.

Some very interesting information has been gleaned from a report on drainage in Yakima County, Wash. Mr. T. W. Macartney, drainage engineer, states that very little difficulty has been experienced there with tile drains constructed in quicksand or other mucky material where a sufficient foundation of gravel has been used. The method used is to have the pipe man or tile layer tramp in as much gravel as he can until a firm foundation has been made.

In the cases where extremely soft material was encountered approximately the same system of construction was used as on the Huntley project; that is, boulders rammed into place and then surfaced with finer gravel. Cradles were not, however, used to any great extent.

The amount of gravel and boulders used varied with each specific case; in one instance 20 cubic yards were used to the station. No case of failure or settlement on this work has yet been noted where sufficient gravel was used.

There have been constructed in Yakima County 78 miles of pipe drains and 74 miles of open drains, reclaiming 85,000 acres of land, at a total cost of \$1,030,740, averaging a trifle over \$12 per acre.

The Engineering News-Record cites an instance at Cadillac, Mich., where a sewer tile line with open joints was constructed through quicksand material and failed through settlement of the tile, the maximum deviation being about  $4\frac{1}{2}$  feet.

Briefly summarizing the various construction methods noted, it appears that cradles alone, cradles with gravel under and around the tile, and cradles supported on piling at too great distances have all proven to be unreliable in quicksand, with the exception of work at Yakima, Wash., regarding actual conditions on which we have very little information. Balanced against this we have cradles supported at frequent intervals (3 to 4 feet) and gravel placed around the tile as the only successful method yet developed positively to prevent the tile settling away from the original alignment.

This method, however, has proven so expensive that it can be used only for short distances and in cases of extreme necessity, and it would probably be impossible to accomplish this class of work where a trenching machine is doing the excavation.

## UTILIZATION OF RETURN FLOW, BOTH SURFACE AND UNDERGROUND.

By A. H. Ayers, Formerly Project Manager,  
Shoshone Project, Wyoming.

ON any irrigation project the amount of water actually required for plant use constitutes a very small percentage of the amount diverted at the head of the canal system. Losses occur all along the line of delivery, some of which are recoverable, whereas others, such as evaporation, which can be returned only as precipitation, are inevitable. The water thus lost may return naturally through porous subsoils to the stream from which it was diverted; frequently, however, extensive subsurface drainage systems are necessary to prevent the rapid rise of the ground water plane and disastrous waterlogging of cultivated areas. When projects are in the early stages of development and the available water and the capacity of the canal and lateral systems are more than ample to supply the demand for water, little attention is paid to losses from the system unless seepage of cultivated lands results. When, however, the system is heavily taxed to supply the demand, or the available water supply is restricted by prior rights, the recovery of surface waste and underground seepage becomes increasingly important.

(Continued on page 477.)

There yet remain several other possibilities, as yet seemingly untried, so far as noted. Among these may be mentioned the possible use of sewer pipe, with a joint calked with a good filter material, these to be laid on substantial ladders and well blinded in gravel. Another method possibly is to use a wood-stave pipe, the lower half of which should be solid while the upper portion could be perforated with holes and these covered with a good filter material which would effectually screen out the minute solid particles, allowing only water to enter the pipe.

The cause of failure of the various tile lines constructed under the conditions described seems to have been due to the saturated material being carried or forced into the tile and thence washed away; and as practically all this material comes from below the tile, it follows that the pressure of the backfill forces the tile down as fast as it is undermined. The problem then resolves itself into devising a method of building tile drains in such a manner that the water alone, with all solid material such as sand, clays, loam, and various other soil ingredients screened out, will have free access to the tile. Effectively to accomplish this result is the problem which must be solved if tile drains are to maintain their adaptability for drainage work under these conditions.

The lands first developed under irrigation in the Western States were largely situated in the valleys closely adjacent to the streams supplying water. These stream bottoms were usually of porous subsoil and water applied in excess of plant needs soon found its way back to the stream and furnished an increased supply to lands farther downstream. In the South Platte Valley in Colorado this rapid percolation back to the stream results often in the return flow furnishing the entire supply for lands lower down the stream.

In more recent developments canals were carried farther and farther away from their source of supply and oftentimes into other drainage areas. The seepage loss from the upper part of the canal found its way into lower canals, but the surface waste from irrigation and the seepage from laterals percolated or discharged direct into channels theretofore dry. On the topography and relative elevation of the lands of such projects depends the measure of their adaptability for utilizing this return flow.

On the Shoshone project about 43,000 acres of the Garland Division and 17,500 acres of the Frannie Division are under ditch. About 14,000 acres of the southern portion of the Garland Division lands drain directly into Shoshone River, and their run-off augments the flow of the river available for prior rights below Corbett Diversion Dam. The remainder of the Garland Division drains into Bitter Creek, and its flow at peak seasons is as much as 180 second-feet, about equally divided between surface waste and out-flow from drains. The slope of the lands is from 26 to 90 feet to the mile. Development of a recovery system of surface waste thus far is limited to two major diversions from Bitter Creek, one of 15 second-feet and the other of 50 second-feet capacity, and several minor inlets to laterals. In 1919 with these two diversions a steady recovery of about 35 second-feet was secured into laterals C and W. In the Frannie Division nearly all the lands now under ditch drain into Pole Cat and Sage Creeks. Pole Cat Creek has steep, high quicksand banks and no very large steady return flow as yet. Sage Creek has lower banks and a fall of about 30 feet to the mile. It is crossed by the Frannie Canal, the Deaver Canal, and Lateral D-56. Wasteways are provided in all these canals; a pickup diversion has been built at the crossing of D-56 and is planned for the Deaver crossing of the creek and for the D-56 crossing of another large coulee which will carry considerable surface waste.

About 24,000 acres of the Garland Division are protected from seepage by a closed drain system containing about 85 miles of tile of 10 to 18 inches diameter, laid on grades approximating 0.005. As these drains have been extended beyond their original proposed length and have tapped an area larger than originally

planned, they are at peak season sometimes heavily loaded. To relieve this condition drains of 18-inch diameter on flatter grades have in some instances been tapped into them at manholes and run to emergence from the ground and delivery into surface ditches discharging into laterals. From the most effective of these lines a steady flow of 5 second-feet was recovered into Lateral D in 1919, and many similar opportunities exist whereby like steady flows may be secured. The most attractive feature about such recovery is that the flow has no diurnal variation and is heaviest at the time the demand is greatest. Several such relief drains are planned in further development of the drainage system which will at the same time return 10 to 15 second-feet to the lateral system.

The Oregon Basin project, investigations of which have been conducted by the Service the past year, is particularly adapted to utilization of return flow. This project contains about 92,500 acres of irrigable land, of which about 59,500 acres drain into Dry Creek and its branches. Dry Creek acts as the main canal for this area and the various laterals divert from it. At the extreme lower end of the project is an area of about 18,500 acres, the main supply for which is delivered from the Oregon Basin Reservoir through the channel of Dry Creek and a canal diverting from Dry Creek below the major portion of the 59,500 acres of irrigable land draining into that creek. Probably some 45,000 acre-feet of surface waste and percolating underground return will accumulate in Dry Creek during each year after the 59,500 acres are fully developed. Under ordinary operating conditions there would be insufficient return flow early in the irrigation season to supply the demand of the 18,500 acres; at the peak of the return flow there would be a large diurnal variation of flow, and at the end of the irrigation season a return flow in excess of the demand. There is, however, opportunity to construct a regulating reservoir in Dry Creek above the diversion for the 18,500 acres, which will conserve the fall flow for spring use and obviate the difficulty experienced in handling the diurnal variation. Here we have, therefore, almost ideal conditions for maximum conservation of return flow.

Return flow in either dry-creek channels or living streams introduces complications in determining the right to its use, which are now the subject of litigation on the North Platte and Shoshone projects. Return flow usually develops before there is urgent need of its utilization, and it may be appropriated and beneficial use made of it before such use can be economically secured by the project whose lands provide such flow. Design of a project, therefore, should include works to recover, regulate the flow, and re-use in the system the greatest practicable amount of seepage and surface waste that will develop, and appropriations should be made thereof.



The undesirable factor in utilizing return flow is that it removes one of the greatest incentives to economy in the use of water. An unutilized return flow of 100 second-feet resulting from the irrigation of 40,000 acres is a standing reproach against that waste, either on the surface or through the ground. If this return

flow is recovered and used on the lower lands of the project, it no longer advertises that project as wasteful of its greatest asset and produces a false impression of economy when the waste may actually be greater than before the recovery system was installed.

### IRRIGATION STATISTICS, FOURTEENTH CENSUS.

The Director of the Census announces, subject to correction, the following preliminary statistics on irrigation for the counties named. Similar state-

ments for other counties will be issued as soon as the figures are available and will be published from time to time in the RECLAMATION RECORD.

#### *Irrigation by counties, 1920 and 1910.*

State and county.	Acreage to be irrigated by works either completed or under construction.			Acreage to which existing works are capable of supplying water.			Acreage irrigated.			Acreage available for settlement in 1920. <sup>1</sup>
	1920	1910	Increase.	1920	1910	Increase.	1919	1909	Increase.	
Los Angeles County, Calif.	362,116	241,794	120,322	329,935	183,506	146,429	247,223	145,586	101,637	8,271
Flathead County, Mont. <sup>2</sup>	33,787			15,842			11,239			1,919
Lincoln County, Mont.	13,114	4,281	8,833	8,730	3,081	5,649	5,349	2,105	3,244	
Mineral County, Mont. <sup>3</sup>	6,690			2,054			967			1,821
Missoula County, Mont. <sup>4</sup>	344,033			219,476			101,026			
Sanders County, Mont.	25,363	9,812	15,551	8,022	4,101	3,921	5,749	3,101	2,648	2,110
Banner County, Nebr.	3,859	2,110	1,749	2,843	1,965	878	2,303	1,915	388	
Buffalo County, Nebr. <sup>5</sup>	10,769			7,309			3,104			
Cherry County, Nebr. <sup>5</sup>	1,373			1,301			501			
Cheyenne County, Nebr.	5,958	4,345	1,613	5,778	3,995	1,783	5,247	3,635	1,612	
Dawson County, Nebr.	142,851	126,809	16,042	65,975	30,933	35,042	34,700	12,742	21,958	
Deuel County, Nebr.	11,555	9,568	1,987	11,455	4,660	6,795	10,077	4,745	5,332	
Garden City, Nebr.	33,514	47,429	<sup>6</sup> -13,915	22,654	21,604	1,050	18,688	16,164	2,524	
Keith County, Nebr.	31,155	36,160	<sup>6</sup> -5,005	28,647	19,581	9,066	23,013	13,140	9,873	
Kimball County, Nebr.	12,337	3,901	8,436	11,530	3,507	8,023	9,288	3,432	5,856	
Lincoln County, Nebr.	40,840	55,820	<sup>6</sup> -14,980	37,280	38,240	<sup>6</sup> -960	30,705	34,760	<sup>6</sup> -4,055	
Morrill County, Nebr.	84,508	70,296	14,212	55,768	56,990	<sup>6</sup> -1,212	44,981	29,445	15,536	
Sioux County, Nebr.	17,607	39,159	<sup>6</sup> -21,552	8,169	7,170	999	5,796	5,576	220	
Morgan County, Utah	13,609	12,058	1,551	13,356	11,606	1,750	12,092	11,309	783	
Big Horn County, Wyo. <sup>7</sup>	217,987			161,166			108,088			20,570
Campbell County, Wyo. <sup>8</sup>	3,278			2,220			1,066			
Converse County, Wyo. <sup>9</sup>	53,500			43,800			30,800			
Crook County, Wyo. <sup>10</sup>	1,925			1,689			951			
Hot Springs County, Wyo. <sup>11</sup>	23,333			21,125			29,943			
Johnson County, Wyo.	96,880	104,492	<sup>6</sup> -7,612	82,458	75,301	7,157	62,908	54,838	8,070	
Natrona County, Wyo.	21,888	36,837	<sup>6</sup> -14,949	14,890	29,255	<sup>6</sup> -14,365	10,385	22,498	<sup>6</sup> -12,113	
Niobrara County, Wyo. <sup>12</sup>	1,427			1,102			759			
Park County, Wyo. <sup>13</sup>	282,889			101,725			176,227			
Sheridan County, Wyo.	107,812	117,568	<sup>6</sup> -9,751	90,238	114,285	<sup>6</sup> -24,047	68,331	94,141	<sup>6</sup> -25,810	
Washakie County, Wyo. <sup>14</sup>	60,349			50,197			41,179			4,493
Weston County, Wyo. <sup>15</sup>	12,543			8,618			6,263			

<sup>1</sup> To be supplied with water by works either completed or under construction.

<sup>2</sup> Error in 1910 figures renders it impossible to present comparative data.

<sup>3</sup> Mineral County was organized from part of Missoula County in 1914, consequently comparative figures for 1910 can not be given.

<sup>4</sup> Missoula County was divided in 1914, a part forming Mineral County, consequently comparative figures for 1910 can not be given.

<sup>5</sup> Data not reported separately in 1910, consequently no comparative figures can be given.

<sup>6</sup> Decrease.

<sup>7</sup> Big Horn County was divided in 1913, a part of the county being organized as Washakie County and a part forming part of Hot Springs County, consequently no comparative figures for 1910 can be given.

<sup>8</sup> Campbell County was organized Jan. 6, 1913, from parts of Crook and Weston Counties, consequently no comparative figures for 1910 can be given.

<sup>9</sup> Converse County was divided Jan. 6, 1913, Niobrara County being organized at that time from the eastern part of Converse County, consequently no comparative figures for 1910 can be given.

<sup>10</sup> Crook County was divided in 1913, Campbell County having been organized from parts of Crook and Weston Counties Jan. 6, 1913, consequently no comparative figures for 1910 can be given.

<sup>11</sup> Hot Springs County was organized Jan. 6, 1913, from parts of Big Horn, Fremont, and Park Counties, consequently no comparative figures can be given.

<sup>12</sup> Niobrara County was organized Jan. 6, 1913, from a part of Converse County, consequently no comparative figures for 1910 can be given.

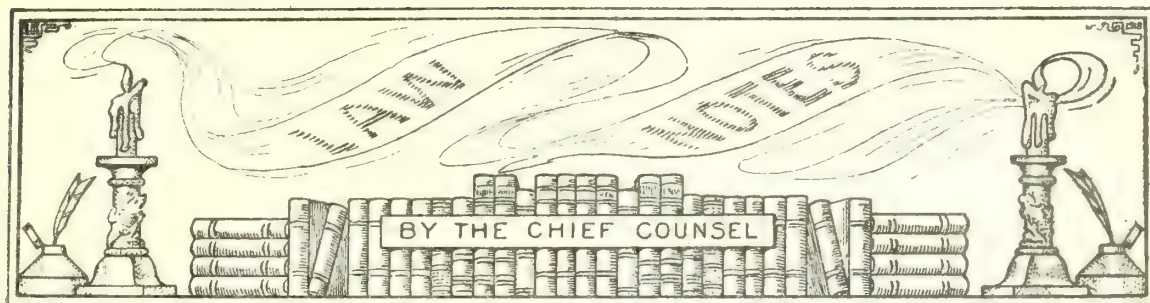
<sup>13</sup> Park County was divided in 1913, Hot Springs County being organized Jan. 6, 1913, from parts of Big Horn, Park, and Fremont Counties, consequently no comparative figures for 1910 can be given.

<sup>14</sup> Washakie County was organized from a part of Big Horn County Jan. 6, 1913, consequently no comparative figures for 1910 can be given.

<sup>15</sup> Weston County was divided in 1913, Campbell County being organized from parts of Crook and Weston Counties Jan. 6, 1913, consequently no comparative figures for 1910 can be given.

Prickly pear is green and succulent and admirably adapted to produce "good condition" in cattle when used with dry feeds. Cattle in brushy pastures are known to have subsisted upon it even without water for long periods.

Flocks of poultry headed by males of pure breeding show a greater percentage of standard-bred females and a smaller percentage of scrubs than any other class of farm live stock.



### Receipts Under the Federal Water Power Act.

(Extract from) An act to create a Federal Power Commission; to provide for the improvement of navigation; the development of water power; the use of the public lands in relation thereto; and to repeal section 18 of the river and harbor appropriation act approved August 8, 1917, and for other purposes. (Act of June 10, 1920, Public No. 280, 41 Stat., —.)

\* \* \* \* \*

SEC. 17. That all proceeds from any Indian reservation shall be placed to the credit of the Indians of such reservation. All other charges arising from licenses hereunder shall be paid into the Treasury of the United States, subject to the following distribution: Twelve and one-half per centum thereof is hereby appropriated to be paid into the Treasury of the United States and credited to "Miscellaneous receipts"; 50 per centum of the charges arising from licenses hereunder for the occupancy and use of public lands, national monuments, national forests, and national parks shall be paid into, reserved, and appropriated as a part of the reclamation fund created by the act of Congress known as the reclamation act, approved June 17, 1902; and 37½ per centum of the charges arising from licenses hereunder for the occupancy and use of national forests, national parks, public lands, and national monuments, from development within the boundaries of any State shall be paid by the Secretary of the Treasury to such State; and 50 per centum of the charges arising from all other licenses hereunder is hereby reserved and appropriated as a special fund in the Treasury to be expended under the direction of the Secretary of War in the maintenance and operation of dams and other navigation structures owned by the United States or in the construction, maintenance, or operation of headwater or other improvements of navigable waters of the United States.

### Authority of Land owners in Irrigation Districts.

The whole purpose and scope of the Wright Irrigation District act of California, so far as it relates to new construction work, rests on the adoption of plans and the approval of landowners of the district, and does not rest primarily with the directors, who are not empowered to carry on any new work without authorization, so that under section 39 funds can be used by the directors in the prosecution of new work only when previously authorized by voters. (*Buschman et al. v. Turlock Irr. Dist. et al.* (Calif.), 190 Pac. 491).

### Status of Water Rights When Represented by Stock in Company.

Where the owners of water rights appurtenant to their several tracts of land formed a mutual corporation and transferred their water rights to the corporation in exchange for stock representing the right to water, the water right remained appurtenant to the land notwithstanding the formal change in ownership, and passed to a mortgagee of the land and appurtenant water rights as against a subsequent execution buyer of the stock, which still stood on the corporate books in the name of the mortgagor. (*Woodstone Marble & Tile Co. v. Dunsmore Canyon Water Co. et al.* (Calif.), 190 Pac. 213.)

### Implied Easement for Irrigation Ditch.

Where the owner of land sold a part after the establishment of an irrigation ditch across the part conveyed, an implied understanding arose that the lands sold were to continue subject to the right to have the water flow through such ditch, the easement being obviously apparent and the parties having knowledge thereof at the time of the grant. (*Palvutjian v. Terkanian et al.* (Calif.), 190 Pac., 503.)

### Collection of Water Charges Under Act of August 9, 1912.

All water-right accounts subject to the act of August 9, 1912 (37 Stat., 265), shall be so designated on the project books. Before each charge is due, a notice shall be sent, with bill, to the water user, calling attention to the act and its effect. If default in payment is made, notice shall be served on all parties having any record interest in the land affected that title to the land has passed to the United States free of incumbrance and that redemption may be made within one year upon payment of the delinquent charge, with interest at 8 per cent per annum, plus the cost incurred. The penalty of 1 per cent per month provided by the extension act of August 13, 1914 (38 Stat., 686), does not apply to these accounts. The cost to be charged shall include the expense of necessary abstract of title, and a reasonable sum to cover expense of the work involved. The United



State will not take possession of any of the lands affected during the period of one year prescribed for redemption. (Departmental Decision, Aug. 3, 1920; C. L. 921.)



BERNARD E. STOUTEMYER.

District counsel, United States Reclamation Service, Boise, Idaho. Born in New Orleans, La., February 7, 1879; graduated from Wichita (Kans.) High School; attended night law school at Cincinnati, Ohio, two years; graduated from law department of the University of Michigan in 1904; in private law practice from 1904 to 1906; entered Reclamation Service December 14, 1906; has been admitted to practice in Supreme Courts of Michigan and Idaho and the Federal, District, and Circuit Court, Circuit Court of Appeals, and Supreme Court of the United States. Is at present field legal adviser for Boise, Minidoka, King Hill, and Jackson Lake enlargement projects.

### The Glories of Irrigation.

"Where the lizard and the prairie dog had lived their wild unhampered lives the Shorthorn and the Berkshire now fatten upon alfalfa grown and matured by the water diverted through this canal." (Bracken v. Chadburn (Utah), 185 Pac. 1021.)

—*Ottamar Hamel.*

### BOOKS REVIEWED.

PUBLICATIONS OF THE UNITED STATES RECLAMATION SERVICE. Pamphlet of 96 pages, with map of projects and chart of organization of Government of the United States, 5th edition.

This pamphlet, the fifth edition, supersedes the list issued in 1917 and contains a complete list of the annual reports, State cooperative reports, handbooks, bulletins, maps, and specifications issued by the Service, with prices of those for sale.

A complete list of settlement pamphlets issued by the Service and also those printed by rail roads, boards of trade, and chambers of commerce of the towns on the respective projects is given. A list of motion-picture films is also included.

Under the engineering section a list of the standard designs and specifications is included, and a complete list of over 500 specifications issued by the Washington and Denver offices, and a complete list of the standard and office designs of the Denver office.

In the last part of this bulletin are given lists of reports and bulletins relating to the work of the Reclamation Service, which have been printed by other departments and bureaus of the Government. This list includes reports of the Secretary of the Interior, the Geological Survey, General Land Office, Bureau of Mines, Bureau of Plant Industry, Bureau of Soils, Farmers' Bulletins, and Year Book separates issued by the Department of Agriculture. The international character of the work of the Reclamation Service is also shown by the list of treaties and reports under the State Department in connection with the work on the Rio Grande and the Milk River projects. There are also included a list of separates or reprints from the reports of the Smithsonian Institution and the National Geographic Magazine describing the work of the Reclamation Service.

The bulletin closes with a list of over 400 reports and hearings by Congress on the development of irrigation and the work of the Reclamation Service and a complete index including finding list of specifications.

A reprint of the part of list containing the publications for sale has been issued for general distribution.

Copies of separates may be obtained, free of charge, on application to the Chief Clerk, United States Reclamation Service, Washington, D. C.

## DELIVERING MAIL AT ELEPHANT BUTTE.

Mr. L. M. Lawson, project manager, Rio Grande project, sends us the following:

A large number of troops, representing practically all branches of the Army service stationed at Fort Bliss, El Paso, Tex., have established a summer camp at Elephant Butte Dam, taking advantage of the presence of the large body of water which makes possible fishing, boating, and swimming. Detachment of troops made the 120-mile trip from Fort Bliss to Elephant Butte, with several camps along the Rio Grande at Mesilla Park, Leasburg Dam, and other points. Daily contact with troops en route was made by aeroplane service, and when in camp at Elephant Butte daily mail service was maintained by aeroplanes.



Mail plane flying over Elephant Butte.

The accompanying illustration, which was furnished by E. C. Snow, reservoir superintendent, Reclamation Service, shows an Army plane returning to El Paso after delivery of mail to the camp at Elephant Butte.

## "MAN'S WATER" IN HAWAII.

The term "man's water," as used in Hawaii, has nothing to do with the eighteenth amendment; it means only the quantity of water that one person can handle for irrigation. This quantity varies greatly, depending upon the condition of the furrows, the age of the crop, and the knowledge and skill of the irrigator. Some measurements indicate that it is about three-fourths of a second-foot, but it may be almost any quantity under 1 second-foot, which is approximately two-thirds of a million gallons per 24 hours.

The United States Geological Survey, Department of the Interior, is now cooperating with the Government of Hawaii in making a topographic survey of the islands, which is considered prerequisite to a careful consideration of irrigation projects.

## AUGUST WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

August in the Western States averaged rainier than usual, while temperature conditions showed considerable diversity. Till after the middle of the month cool weather prevailed in Colorado and to southward and eastward, while generally in the rest of the West it was hot, the period from 10th to 15th being particularly so in Nevada and the interior portions of California and Oregon. The latter part of the month was mainly cooler than normal, save in the Dakotas and eastern Montana and in some parts of California; indeed, the final week was especially cool in the Plateau and North Pacific States. The month averaged hotter than normal in the Pacific States and near the Canadian border; but elsewhere cooler, notably in the southern plains.

During the first 10 days of August rain of consequence came to scattered parts of the Plateau States and to large parts of the middle and southern plains and of New Mexico. In the middle portion of the month and onward to the beginning of the final week the rains were still very irregular, though reaching many parts of the plains and some parts of Arizona, and being usually liberal in eastern Colorado and thence southward to the Rio Grande. The closing week was the rainiest portion of the month from the Divide westward, and generally there was liberal rainfall at this time in the middle and northern plains. Most of Oregon, Washington, Idaho, and Utah had copious rains at this time. The monthly totals were greater than normal in eastern Colorado and southern Nebraska and thence southward to the Mexican border, with remarkably large amounts in most counties of western Texas. There was usually more than normal rainfall also in the middle and northern parts of California, Nevada, and Utah, and northward from these districts to the Canadian line. On the other hand, the Dakotas, Wyoming, and eastern Montana had mainly less than normal, likewise almost all the drainage area of the Colorado River.

Conditions were favorable for fruit, though the hot, dry weather of the first half of the month did some damage. Where not irrigated truck suffered some and late grain a little from heat and dryness, but the weather favored harvesting and thrashing. Ranges dried up considerably in many States, at least till the final week, and stock water was short in much of Wyoming and Montana; yet live stock on the whole maintained excellent condition.

The Department of Agriculture will be glad to supply, on request, copies of the bulletin entitled "A System of Records or Local Farmers' Fire Insurance Companies."



## MONTHLY PROGRESS REPORTS FOR AUGUST.

Monthly conditions of principal Reclamation Service reservoirs for August, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River...	Roosevelt	11,305,000	2128	1903	1,168,363	1,084,896	1,168,369	140,690	2115.74	2110.27	2115.74
California, Orland	East Park	51,000	1199.68	1111.68	6,100	1,045	6,100	4,807	1158.2	1140.78	1158.2
Idaho:											
Boise	Arrowrock	280,000	3211	2956	149,400	16,837	149,400	171,150	3159.2	3049.9	3159.2
	Peer Flat	177,000	2518	2488	60,082	18,710	60,082		2503.2	2494.4	2503.2
Minidoka	Lake Walcott	95,180	4245	4236	102,900	103,020	106,630	303,758	4245.64	4245.64	4245.95
	Jackson Lake	847,000	6769	6730	476,600	144,240	476,600	423,828	6753.7	6738.02	6753.7
Montana:											
Milk River	Nelson	27,000	2212	2200	28,800	27,900	28,800	1,658	2212.5	2212.2	2212.5
St. Mary Storage	Sherburne	33,000	4788	4720	13,000	5,000	13,000	8,000	4746	4735	4746
Sun River	Willow Creek	16,700	4130	4085	14,789	12,591	14,789	3,000	4128	4125.7	4128
Nebraska-Wyoming, North Platte	Pathfinder	1,070,000	5852	5670	953,560	767,690	953,560	243,750	5846.62	5836.64	5846.62
	Lake Alice	11,400	4182	4159	6,567	5,853	6,567		4175	4173.8	4175
	Lake Minatare	60,700	4125	4074	26,169	18,348	26,169		4106.1	4100.2	4106.1
Nevada, Newlands	Lake Tahoe	120,000	6230	6224					6225.66	6225.24	6225.66
	Lahontan	290,000	4162	4060	151,000	118,200	151,000	41,712	4146	4139.5	4146
New Mexico:											
Carlsbad	McMillan	45,000	3267.7	3241.6	27,250	24,500	27,250	8,000	3264.3	3263.7	3264.3
Rio Grande	Elephant Butte	2,638,800	4407	4321.5	2,059,178	1,952,609	2,059,178	93,720	4391.4	4388.2	4391.4
Oregon, Umatilla	Cold Springs	50,000	621.5	560	22,450	9,400	22,450	12,498	599.58	583.98	599.58
Oregon-California, Klamath	Clear Lake	462,000	4540	4516	277,000	264,000	277,000		4532.5	4531.9	4532.5
South Dakota, Belle Fourche	Belle Fourche	203,000	2975	2920	189,880	152,700	189,880	36,520	2973.1	2968.1	2973.1
Utah, Strawberry Valley	Strawberry	250,000	7558	7517	214,000	204,000	238,000	10,000	7553.4	7551.9	7558
Washington:											
Okanogan	Conconully	13,000	2287	2232	898		898	2,286	2248	2237	2248
Yakima	Bumping Lake	34,000	3426	3389	32,675	15,695	32,675	16,980	3425.2	3410.1	3425.2
	Lake Clealum	22,800	2134	2122	27,940	16,040	27,940	11,900	2135.7	2130.3	2135.7
	Lake Kachess	210,000	2258	2192	220,505	139,130	220,505	81,375	2457.1	2438.2	2457.1
	Lake Kechelus	152,000	2515	2425	71,810	22,915	71,810	49,615	2476.8	2442.4	2476.8
Wyoming, Shoshone	Shoshone	456,600	5360	5132.3	467,367	455,265	468,724	112,012	5361.6	5359.8	5361.8

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> Proposed regulation.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—Water was run in all the canals during August. The demand for water was very heavy during the month due to the large acreage in cotton.

There were six maintenance crews in the field during the month and the following statement shows the average number of men and stock employed and the results accomplished:

Average number of men, 390; average head of stock, 74; miles main canals cleaned, 80; miles laterals cleaned, 291; number of new structures installed, 23; number of old structures repaired, 250; riprap placed, 6,335 feet; dry masonry placed, 2 cubic yards; dirt fill placed, 1,765 cubic yards; concrete placed, 20 cubic yards; concrete pipe laid, 372 feet; corrugated pipe laid, 130 feet.

The Marion  $\frac{3}{4}$ -yard dragline employed in widening the Eastern Canal moved approximately 1,200 cubic yards of dirt during the month.

The Ruth excavator worked on berming the north branch of the Highline Canal, moving 5,537 cubic yards of dirt.

The P. & H.  $\frac{1}{2}$ -yard dragline was being repaired.

*Operation of power system.*—The total power generated during the month was 6,327,890 kilowatt hours.

The Roosevelt and Cross Cut power plants operated continuously during the month. The South Consolidated operated 99 per cent of the month, the Arizona Falls 94 per cent, and the Chandler plant 99 per cent.

The substations all operated during the month without trouble.

All pumping plants were available as needed except for short shutdowns in several plants for necessary maintenance work.

A second temporary pumping unit was installed at the Highline pumping plant and operation commenced on August 21.

The work on the sluice gate at the Joint Head Dam which was started in July was completed and the gate left in excellent operating condition.

*Construction work, Phoenix-Mesa telephone line.*—The digging of holes for the poles was completed to  $1\frac{1}{2}$  miles east of Mesa storehouse. Poles with cross-arms and insulators assembled were set to a point 3 miles east of Tempe. The river crossing span poles were set and guyed.

*Twohy Bros. Co. power connection.*—Transformer substation completed excepting transformers. Holes were dug for all poles for connecting line.

*Scottsdale Ginning Co. power connection.*—Holes were dug and poles were on the ground for the line and substation.

Construction work was delayed, as men were being used on emergency maintenance work on the Roosevelt-Mesa line.

*Office.*—The acreage entitled to irrigation water service on the first of the month was practically the same as the preceding month.—C. C. Cragin.

## YUMA PROJECT, ARIZONA-CALIFORNIA.

Weather conditions were favorable throughout August, and labor conditions were fair.

*Construction.*—On the East Drain Lateral of the Yuma Valley drainage the Bucyrus drag line moved 17,907 cubic yards of material from station 43 to station 53. A timber bridge and a metal flume were constructed across the East Drain Lateral at the east quarter corner of sec. 22, T. 9 S., R. 24 W.

*Operation and maintenance.*—Twenty-eight thousand acre-feet of water were delivered to approximately 33,000 acres. In the Yuma Valley Monighan drag line No. 1 cleaned 11,130 cubic yards of silt from the Central Main Canal from station 146 to station 195; Monighan drag line No. 2 cleaned 10,460 cubic yards of silt from the West Main Canal from station 1071 to station 1130. The V machine cleaned 7.5 miles of small laterals. Work with this machine was suspended for the season on August 14, 1920, and the machine and caterpillars will be overhauled for future work.

The Ruth dredges excavated 3,700 cubic yards of material in cleaning 3.7 miles of laterals on the Yuma Indian Reservation.

The maximum discharge of the Colorado River during the month was 23,200 second-feet and the minimum 12,600 second-feet. The gauge reading on August 31 was 16.25, corresponding to a discharge of 13,000 second-feet. The total discharge for the month was 1,080,030 acre-feet.

*Arizona cooperative work.*—The field party under the direction of S. S. Carroll, engineer, completed the survey of the relocation of the railroad around the San Carlos Reservoir, including about 30 miles of line, August 14; also a reconnaissance survey of about 10 miles of highway above the high-water line to the dam site. The party was disbanded and Mr. Carroll came to the Yuma office and spent the balance of the month in platting up the field notes.

In the Yuma office studies were continued and data collected for the final report on the San Carlos project.

*Boulder Canyon Reservoir.*—R. W. Burchard, assistant topographer, United States Geological Survey, reached the Boulder camp with his party on August 20 and prepared at once to begin the detailed survey of the dam site. Also a level party was sent up the river to establish bench marks in the reservoir site.

The pontoons for supporting the drill equipment were constructed and floated on August 20. The lumber did not swell as expected, so the bottom boards of the pontoons had to be removed and replaced and the cracks calked with oakum. This work was completed August 22. The river was too high until near the end of the month for reaching the dam site in safety. At the end of the month the pontoons were floated into place and anchors secured for a cable across the river.

*Yuma Mesa.*—Seventeen miles of location were run and 20 miles of profile taken by the field party. In the office the work of plotting the field notes and designing the distribution system was carried on.

*Imperial Valley investigations.*—An office was established at El Centro, Calif., and three survey parties were organized. Thirteen and one-half miles of surveys for branches of the proposed All-American Canal were completed. Labor was scarce and wages high.—R. M. Priest.

## ORLAND PROJECT, CALIFORNIA.

The month of August was characterized by high temperatures. Due to these conditions, abnormally high losses occurred in the transit of stored water

from the East Park Reservoir to the project diversions and in the transmission through the distribution system. Transit losses from East Park to the South Diversion were twice as large as normal and the distribution loss 50 per cent above normal. Precipitation, amounting to 0.12 inch at Orland and 0.04 inch at East Park, which occurred on the 24th, served to reduce these losses during the remainder of the month.

No water from the natural flow of Stony Creek was available for project use, and 4,800 acre-feet were released from East Park Reservoir for project requirements. Water deliveries, amounting to 1,430 acre-feet, were made to those lands having a portion of the season's allotment unused.

The fourth crop of alfalfa on a limited area was harvested and the larger portion of the almond harvest was completed. The early p'anting of milo was practically matured at the close of the month.

Maintenance work consisted of repairing concrete lining, mowing and burning weeds on the lateral system, the force engaged consisting of three men. Three teams continued delivery of gravel on the South Canal for fall work of concrete lining, 350 cubic yards being delivered.—R. C. E. Weber.

## GRAND VALLEY PROJECT, COLORADO.

The weather during August was slightly cooler than normal and favorable for all outside work. Labor conditions were somewhat improved.

The crop outlook is satisfactory, with the exception of sugar beets, which in some localities have been damaged by early leaf. Spring wheat and oats have been harvested and thrashing is in progress. Alfalfa made an excellent growth and the third cutting was nearly ready to harvest. Picking of pears and peaches was in progress in the upper valley at the end of the month.

The irrigation system was operated continuously during the month, delivering 11,000 acre-feet of water to 20,000 acres of land in the project and the irrigation districts. No operation difficulties of importance were experienced and all water deliveries were made with little interruption. The maintenance crews were engaged in cleaning moss and weeds from laterals, repairing minor breaks, and installing structures.

Drainage construction was continued, with one drag-line excavator working on the project and two excavators and one trenching machine in the Grand Valley drainage district. On account of moving some of the machines to new work and time consumed for repairs progress was slow. One and two-tenths miles of drain were completed and 0.4 mile of old drain was deepened, involving 40,000 cubic yards of excavation. Drainage investigations were continued at the lower end of the project.

Visitors on the project during the month were J. L. Burkholder, drainage engineer; W. L. Drager and F. Bonstedt, of the Denver office; and C. S. Scofield, A. C. Cooley, and F. E. Headley, of the Department of Agriculture. Mr. Headley remained on the project until the end of the month to make a study of agricultural conditions.—S. O. Harper.

## UNCOMPAHGRE PROJECT, COLORADO.

During August conditions remained favorable for crop growth, harvesting grains, and digging early potatoes. Rains on the 2d and 3d interfered with and delayed the putting up of the second cutting of alfalfa on parts of the project. As a rule, farm work progressed along normal lines for this season of the



year. Harvesting and thrashing of wheat and oats continued throughout the month. The yields of wheat were good, a few pieces making 65 bushels per acre. Two hundred and fifty-five carloads of potatoes were shipped from Olathe during the month. The price for early potatoes has gradually declined until the price quoted at the close of the month was considerably below that of last year. Beets and alfalfa are making good progress. Considerable quantities of early apples were marketed during the latter half of the month.

Labor remained scarce for both farm and canal work.

After the rains of August 2 and 3 there was sufficient water in the Uncompahgre River with the amount delivered through the Gunnison tunnel to supply all needs of the water users until the 25th, after which the amount gradually decreased until only 90 per cent was being delivered at the close of the month. The Gunnison River carried sufficient water to supply the tunnel at full capacity until the 31st.

Water was shut out of the Gunnison tunnel on August 16 for inspection of the concrete lining and the South Canal structures. Everything was found in good shape. On August 24 the water was again shut out for a few hours to remove a float that had lodged in the concrete lining below the Seven Drops.

A small break occurred in the West Canal near milepost 11.10 on August 23. Repairs were made and water put into the canal on the night of August 24.

C. S. Scofield, of the Department of Agriculture, Washington, D. C.; A. C. Cooley, in charge of the demonstration work on reclamation projects, with headquarters at Salt Lake City; and F. B. Headley, soil specialist, with headquarters at Fallon, Nev., were visitors on the project on August 9 and 10. F. Bonstedt, engineer, United States Reclamation Service, and W. L. Drager, assistant engineer, United States Reclamation Service, visited the project August 25 and 26.—*Porter J. Preston.*

#### BOISE PROJECT, IDAHO.

During the first half of August the temperature was above normal, the maximum occurring on the 15th, when 107° was recorded. After the 16th there were a number of cool, cloudy days. Light showers occurred on the 25th and 27th.

*Labor conditions.*—All available labor was employed, but was not sufficient to meet the demands for harvest and construction work.

*Farming operation.*—Harvesting of the second cutting of alfalfa and the grain crop was completed. The grain crop is very heavy; a large amount remains to be thrashed. Owing to the shortage of cars little grain was shipped. Sufficient refrigerator cars were available to move the early potatoes. Shipments ran from 50 to 60 cars per day during the greater part of the month.

*Water supply.*—By the latter part of the month the flow of Boise River dropped to 533 second-feet. The total discharge was about 36 per cent less than normal. The demand for water was heavy. By the last of the month practically all crops were matured. A small amount of water will still be needed for pastures and late seeding.

*Operation and maintenance.*—The Main Canal and all of the distribution system were operated. Moss and weeds interfered to some extent on the laterals.

*Construction.*—Work was resumed on the Notus Canal with a small force of men. Preparations were begun for lining the hillside section through Cald-

well. On August 24 proposals were received for the excavation of about 228,000 cubic yards on the Notus Canal on the north side of Boise River.

*Drainage.*—Both drag lines continued work in the Big Bend and Riverside Irrigation Districts. Good progress was made both on the excavation and the placing of structures.

*Surveys.*—Surveys were made of the seeped areas under the project. Lines and grades were given for the construction work in progress.

*Visitors.*—During the month O. Hamele, chief counsel, and J. L. Burkholder, drainage engineer, visited the project.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

August weather was dry and hot but favorable for growing crops.

At Camp 6 the embankment for the McEachern concrete flume was completed and work begun on finishing the subgrade. The excavation for the pedestals and inlet and outlet structures of the McEachern wood stave flume was completed and the pedestals and head wall of the outlet structure were poured. The bents were erected and a number of the stringers were placed for the wood stave flume. Excavation for Wasteway No. 11 was about 70 per cent completed at the end of the month.

Camp No. 8 was established near the site of the Cassia siphon on August 6 and excavation for this siphon was about 80 per cent completed at the end of the month. Forms for the siphon barrel were cut at King Hill and shipped to Camp 8 and were about 30 per cent erected at the end of the month.

Camp No. 4 was moved to a point opposite station 86 during the first part of the month. Excavation for the head end flume bench was under way at the end of the month.

All forms for concrete plants are being made up at King Hill.

Two engineering field parties were engaged during the month giving lines and grades for structures.

The operation and maintenance forces working under the King Hill Irrigation District maintained a successful delivery of water throughout the month.

Chief Counsel Ottamar Hamele visited the project on the 21st.—*Walter Ward.*

#### MINIDOKA PROJECT, IDAHO.

On the South Side pumping unit the delivery of water was carried on throughout the entire month of August. The demand continued very heavy up until the 28th, when heavy rains caused the demand to slacken about 200 second-feet. Three regular maintenance crews consisting of 5 to 8 men each were engaged in cutting moss, weeds, and willows and making repairs to minor structures and to ditch banks.

In connection with reconstruction work on the C-1 transmission line, about 2 miles of poles were set ready for stringing the wires.

At Jackson Lake the regular operation and maintenance work was carried on; also some time was spent in removing driftwood from the upstream face of the dam.

The weather was clear and warm up to the 19th of the month, after which the nights were cool. There was a light frost on the 19th and a harder one on the 31st. The total precipitation from January 1 to August 31 was 4 inches, which makes this year the driest year of record since 1906, with the exception of

1910, when the precipitation for the same period was 3.52 inches.

Discharge at Howells Ferry amounted to 303,560 acre-feet, as compared with 387,590 acre-feet for July. The total diversions to the project amounted to 142,595 acre-feet, being 83,165 acre-feet to the north-side gravity and 59,430 acre-feet to the south-side gravity, of which 43,560 acre-feet were pumped to the south-side pumping unit.

At Jackson Lake the gates remained open all the month, and the water surface lowered from elevation 6754.05 to elevation 6738.08, corresponding to a draft on the storage of 339,230 acre-feet. The total storage on August 31 amounted to 145,390 acre-feet. On August 31 of last year there was no storage in Jackson Lake Reservoir.

C. S. Scofield, of the Department of Agriculture, visited the project on August 4; P. A. Rosendorn, senior draftsman in the Washington office of the Reclamation Service, visited the project for a couple of days during the month, going over the matter of preparation of farm-unit plats. W. F. Parry, former water master, visited the project on the 10th; Ottamar Hamele, chief counsel, visited the project on the 20th and 21st. C. J. Blanchard, statistician, and R. B. Dame, official photographer, arrived here on the 30th and were still on the project at the end of the month.—*Barry Dibble.*

*Prevailing crop prices at close of August, 1920.*

Project.	Alfalfahay, per ton.		Bar- ley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Pota- toes, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	\$18-\$20	\$22-\$27	\$1.50	\$1.17	\$2.70	.....
Yuma.....	20.00	28.00	.....	.....	.....	.....
Orland.....	20.00	26.50	1.05	.....	2.04	.....
Grand Valley.....	20.00	24.00	1.90	1.10	1.75	\$1.25
Uncompahgre.....	12.00	.....	.....	1.20	1.95	.90
Boise.....	10.00	16.00	.90	1.00	1.90	.90
King Hill.....	.....	.....	.....	.....	.....	.....
Minidoka.....	8.00	12.00	1.32	.51	1.90	.78
Huntley.....	10.00	15.00	.....	.80	2.25	2.10
Milk River.....	16.00	20.00	.65	.42	2.10	2.40
Sun River.....	15.00	20.00	.75	.65	2.10	1.80
Lower Yellowstone.....	18.00	.....	1.00	.90	2.20	2.25
North Platte.....	.....	.....	.....	.....	.....	.....
Newlands.....	16.00	22.00	.85	.....	1.95	3.00
Carlsbad.....	.....	17-20	.....	.....	.....	.....
Rio Grande.....	18.00	22.00	.....	.....	2.00	.....
North Dakota pumping.....	.....	.....	.....	.....	.....	.....
Umatilla.....	.....	17.00	.....	.....	.....	.....
Klamath.....	17.50	25.00	.96	.58	2.05	.....
Belle Fourche.....	8-10	16.00	.....	.70	2.00	2.10
Strawberry Valley.....	.....	.....	.....	.....	.....	.....
Okanogan.....	30.00	.....	.....	.....	.....	4.20
Yakima:	.....	.....	.....	.....	.....	.....
Sunnyside unit.....	16.00	20.00	.....	.....	.....	1.10
Tieton unit.....	16.00	20.00	.....	.....	.....	1.10
Riverton.....	.....	.....	.....	.....	.....	.....
Shoshone:	.....	.....	.....	.....	.....	.....
Blackfoot.....	.....	.....	.65	.40	2.13	.....
Flathead.....	.....	.....	.....	.....	.....	.....
Fort Peck.....	15.00	18.00	.....	1.00	2.10	5.00

HUNTLEY PROJECT, MONTANA.

Weather conditions during August were normal. On the 28th, 0.58 inch of rain fell, the remainder of the month being very dry. Labor conditions were fair, and a crew for the necessary operation and maintenance was maintained.

Supplemental construction was carried on by one crew, and consisted of replacement of timber turnouts and checks by ones of permanent type.

The demand for water was well distributed through the month, so no serious rushes were experienced. The Yellowstone River remained at a height so that 425 second-feet could be diverted into the Main Canal with the head gates fully opened. The hydraulic pumps were operated until the 22d when unit No. 2 was shut down, as the top-bearing plate was worn out. A new plate was installed, and on the 26th the unit was again in operation. On the 25th, unit No. 1 was stopped, with its top-bearing plate worn out. As no new parts were on hand, the unit will not be operated again this season. On the 22d the auxiliary pumps were started and operated until the 28th, when the plant was closed for the season. No serious breaks occurred during the month.

The general crop conditions remain good. The High Line district, visited by the hailstorm on June 23, has harvested some very good crops. Thrashing has been in progress all over the project, and plans for the harvest of the beet crop are being made.

Drainage work consisted of backfilling operations and the investigation of one area a mile west of Ballantine. On the 30th, investigations for drainage needs in the second unit were started.

Visitors during the month were Chief Counsel Ottamar Hamele, District Counsel Willis J. Egleston, and Senior Draftsman P. A. Rosendorn.—*Wm. M. Green.*

MILK RIVER PROJECT, MONTANA.

The weather for August was hot and dry, with the precipitation at Malta 1.56 inches, all of which, however, fell during the last five days of the month. The second cutting of alfalfa was completed. Cutting of native blue joint hay is about 90 per cent completed. Practically all irrigated grain crops were harvested and some thrashing done. Not many reports of thrashing are yet available, but the best are around 20 bushels of wheat per acre. The range is in good condition.

The labor supply was even shorter than in previous months. Government forces, contractors, and farmers were all short of adequate help.

All canals on the Malta and Glasgow divisions were operated the greater part of the month and intermittent deliveries, amounting to about 1,600 acre-feet, were made to the farmers. On the Chinook division the private canals were also operated during the greater part of the month.

Construction by contract was in progress on two small earthwork contracts, but poor progress was made, due to the insufficient supply of labor.

Construction by Government forces comprised some structure work on lateral extensions, but poor progress was also made on this work owing to insufficient labor supply. Survey parties were engaged on preparing lateral extensions for advertisement.

Maintenance work consisted of cleaning 2,800 feet of the Dodson North Canal of silt by dragline and cleaning other laterals of willows and vegetable growth, as well as some repairs to minor structures.

Director A. P. Davis visited the Chain Lakes Reservoir site on the 20th. Other official visitors included Charles P. Williams, assistant chief engineer; Willis J. Egleston, district counsel; J. L. Burkholder, drainage engineer; P. A. Rosendorn, senior draftsman, Washington office; S. G. Dawson, irrigation engineer of the Reclamation Service of Canada; and James M. McKittrick, engineer appraiser, Federal Land Bank of Spokane.—*Geo. E. Stratton.*



## ST. MARY STORAGE UNIT.

During August about normal weather conditions prevailed, which were favorable for the operations of the project. The St. Mary Canal was operated during the entire month without serious operation difficulties. A total of 26,742 acre-feet was diverted from St. Mary River and a total of 20,853 was delivered to the Milk River. At the end of the month the operations were discontinued as there was no further requirement for diverting water to Milk River for the Milk River project. Construction at Sherburne Lakes Dam was continued throughout the month, and at this point the excavation for the spillway flume was completed, the embankment of the main portion of the dam was completed except for necessary gravel, graveling the surface of the dam was commenced, about half of the concrete cut-off walls for the temporary flume were placed, and arrangements for starting the gravel screening and hauling plant were made. *R. M. Suel.*

## SUN RIVER PROJECT, MONTANA.

The weather during the first half of August was warm, but the latter half was generally cool. Showers occurred on the 11th and 26th, the latter being accompanied by hail which did serious damage to dry-land crops south of the Fort Shaw Division.

Early in the month camp was opened at Pishkun Reservoir for the construction of dikes and wasteway. Owing to the shortage of labor progress was slow, but at the end of the month the earthwork for the dike at Sun River Slope Canal headworks had been practically completed.

There was a heavy demand for water on the Fort Shaw Division during the first half of the month, but few requests for deliveries during the latter half. On the Greenfields Division water was run in the Greenfields Canal until the 10th and a short run made about the 17th. Little water was used by the farmers on this division during August.

Due to labor shortage and the wet condition of the laterals, no maintenance work was done on the Fort Shaw Division. On the Greenfields Division a small crew of ditch riders and teams was employed raising lateral banks, making miscellaneous repairs to structures, moving buildings at Fairfield camp, and cleaning weeds from laterals. On the Willow Creek reserve about 3½ miles of new fence were constructed.—*Geo. O. Sanford.*

## LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

The hot, dry weather which set in the middle of July continued until the 28th of August, and the mean temperature was 5° above normal. The precipitation, which amounted to only 0.96 inch, was 50 per cent of the normal.

The harvesting of grain crops was in progress during the greater part of the month, and a few of the earlier crops had been thrashed at the end of the month. From reports received from the few who had thrashed it is evident that the yield of wheat will be considerably lower than was expected. Late crops were damaged by rust and the earlier crops suffered materially from the excessive heat. Alfalfa, sugar beets, and corn promise good yields. The area irrigated to date, which is about 15,000 acres, was considerably below the average for the project, although it is believed much better crops would have been raised had irrigation been more extensively followed.

Satisfactory progress was made with drag-line excavators at cleaning silt from the main canal; 6,000 linear feet of canal were cleaned during the month. Laborers were very scarce, owing to the high wages being paid in the harvest fields, and the small crew on each division was engaged in replacing wooden structures with the concrete type and doing other maintenance work.

At the election held on the 31st of the month to determine whether or not irrigation district No. 2 would be formed, the returns showed that 75 were in favor of irrigation districts, with 14 opposed. The directors consist of Sam Hardy, George Pintler, and Robert Edwards.—*L. H. Mitchell.*

## NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

August weather was favorable for crops and for construction work. Two heavy rains occurred, one on the 1st and one on the 27th, which were general over the entire project, and were accompanied by hail in several localities. No serious damage was reported. The mean temperature was 0.8° below the normal for August.

*Operation.*—The inflow at the Pathfinder Reservoir was unusually large, varying between 600 and 2,180 second-feet, the average being 1,181 second-feet. The outflow was maintained at an average of 3,964 second-feet.

The diversion into the Interstate Canal was maintained at 1,650 second-feet during a greater part of the month, but was reduced to 1,500 second-feet for the last few days, owing to the heavy rain. Deliveries were made on demand throughout the month, except for the period between the 20th and 27th, when it was necessary to make deliveries on a rotation basis with four days on and four days off.

The diversion into the Fort Laramie Canal varied between 616 and 725 second-feet. Of this amount 320 second-feet were wasted through the sand trap at mile 0.6 and 210 second-feet at the various other wasteways. An average of 25 second-feet was carried through to Horse Creek at mile 67.5 in order to furnish water for private ditches diverting from the creek.

Water was delivered through the completed portion of the lateral system on the Northport unit west of Indian Creek under temporary arrangements made for this season only.

*Maintenance.*—On the Interstate unit an average force of 59 men and 25 teams was employed on routine operation and maintenance work and on the replacing of small wooden lateral structures in the first and second lateral districts with concrete. No serious breaks occurred with the exception of one on the High Line Canal when the flume over the Wild Horse Drain was washed out by the rain of the 17th. Ten days were required to reconstruct the flume. Monighan drag line No. 4 continued work on the Interstate Canal banks, operating with one shift daily, and strengthening 2,965 linear feet of bank and moving 9,440 cubic yards of material. Two bridges on the Sheep Creek Drain were replaced and one new bridge constructed. One bridge on the Hiersche Drain was washed out, but has not been replaced. A small crew started work on repairing the break in the concrete paving on the upstream slope of the Minatare Dam.

A break occurred in the Fort Laramie Canal at the underdrain at mile 40.5 on the 28th. It was quickly repaired and no serious damage resulted.

*Crops.*—The crops are, in general, in very good shape. The small grain is all harvested and about 50 per cent has been thrashed, good yields being re-

ported. The first and second cuttings of alfalfa were better than the average and the prospects are for a good third crop. Potato digging was begun toward the last of the month. Corn, potatoes, and sugar beets all give promise of good yields. The marketing of crops has not yet begun. The dry-land crops and the crops on the new land under the Fort Laramie unit are especially good.

**Drainage.**—Monighan drag line No. 2 completed the road work for which it was leased to Scotts Bluff County and moved back to resume work on the banks of the Lower Nine Mile drain on the 23d. This machine was operated with two shifts daily until the 27th, when a third shift was added. During the working period on the drain 3,160 cubic yards of material were moved.

Drag line No. 3 continued work on the Dunham-Andrews open drain, operating with three shifts daily and excavating 13,000 cubic yards of class 1 and 1,180 cubic yards of class 2 material. The construction crew started work on the concrete chute on this drain, but work was discontinued and the forces used to blast classified material in the big cut between the Dunham and Andrews seeped areas.

The Kelly Well Co. completed the drilling and casing of the first drainage well on Dutch Flats on the 28th and made preparations to start on the second well. The pump for the well arrived and installation was begun. Four miles of ditch to be used for surface drainage and to carry away the water pumped from the wells were completed and 11 box culverts and 1 wooden flume constructed. The substation to be used for the wells was completed on the 26th.

On the Fort Laramie unit electric drag line No. 2 continued work on the Cherry Creek Drain, operating with two shifts daily and moving 34,611 cubic yards of class 1 material.

**Construction.**—On the Interstate unit the Chicago, Burlington & Quincy Railroad Co. completed the construction of an 18-inch concrete pipe crossing under its tracks to carry water for the Lateral No. 1 extension. Bids were opened on the 6th for the construction of a four-room cottage at Lake Minatare, and the contract awarded to Adams & Ash, of Mitchell, Nebr.

Fort Laramie unit: Electric dragline No. 1 finished moving to the East Springer Lateral on the 5th, and after being overhauled began work at station 71 on the 27th, working upstream. During the working period this machine moved 5,550 cubic yards of class 1 material and completed 0.14 mile of lateral. Dragline No. 3 continued work on the Fort Laramie Canal, operating with two shifts daily. This machine moved 42,302 cubic yards of material and completed 0.69 mile of canal excavation. Dragline No. 4 completed the excavation on the lower end of the Horse Creek Lateral on the 6th and was moved to Endoline to be shipped to Northport for work on the Northport Canal. Dragline No. 5 continued work on the Fort Laramie Canal excavation until the 24th, when it was moved to the Horse Creek wasteway to excavate for that structure. This machine moved 20,280 cubic yards of material, including 255 cubic yards of class 2 and 25 cubic yards of class 3 excavation.

The powder crew, averaging 4 men and 1 team, drilled 2,735 linear feet of holes and used 7,225 pounds of T. N. T. in blasting classified material on the Fort Laramie Canal.

The concrete work on the structures on Lateral 35.4 below the siphon and on sublaterals 15.3 and 15.6 of the Cherry Creek Lateral system was completed during the month. The structures completed were 12

check drops, 20 slope drops, 5 lateral checks, 5 sub-lateral turnouts, 15 farmers' turnouts, 18 weirs, and 2 road crossings. The rock crusher was operated and 125 cubic yards of crushed rock were delivered to structure sites.

Bids were opened on the 2d for lateral extensions in Lateral Division No. 1, and contract was awarded to Roy Price, of Torrington, Wyo. The contractor started work on the 12th and moved 3,000 cubic yards of material during the month.

Northport District: Work was continued by the elevating grader outfit operated by Government forces on the construction of fills on the Northport Canal. The fills over the culverts at stations 273, 330, and 356 were completed and a fill at station 424. The concrete work was completed on the concrete culverts at stations 356, 438, 445, and 475 and the excavation completed for the culverts at stations 516, 574, and 594. Two hundred and thirty-two loads of gravel were hauled to structure sites during the month, making a total of 596 to date.

The location of the high-tension transmission line from Bridgeport to the Indian Creek camp was completed and construction begun on the line on the 26th. During the working period 160 pole holes and 16 anchor holes were dug, 140 poles set, and 76 cross arms placed. The survey for the low-tension line along the canal location was completed and the poles distributed. A spur track for use as an unloading point for the construction work on the unit was completed by the Chicago, Burlington & Quincy Railroad Co. on the 31st.

Work was begun on the construction of residence No. 3 at the Indian Creek camp.

Bids were opened on August 23 and 30 for three schedules of lateral excavation, and contracts were awarded to J. C. Hinds, of Scottsbluff, and Roy Price, of Torrington, Wyo. Advertisements were issued for one more schedule, the bids to be opened September 10.

**Power system.**—The Lingle power plant was operated continuously throughout the month with three shifts daily. Power was delivered to the city of Morrill, Nebr., for the first time on August 2. The power line to furnish power to the city of Mitchell, Nebr., was completed on the 25th and the construction of the substation and necessary transmission line by the city was underway.

Seven and one-half miles of low-tension line were dismantled and 6½ miles were rebuilt. The substation on the Horse Creek Lateral was moved to Fairview Camp for use on the East Springer Lateral and Fort Laramie Canal excavation. The substation on the Springer Lateral was dismantled and shipped to Bridgeport, Nebr., for use on the excavation of the Northport Canal. The substation on the lower end of the Horse Creek Lateral was moved to Kiowa Camp, to be used by drag line No. 3 on the Fort Laramie Canal.

Karl Christensen, lineman, was accidentally killed on August 22 while at work on the high-tension line west of Fairview Camp. Drag-line operators Taylor and Hertzler were injured on the 24th while making a splice on a telephone line which had become charged from the high-tension line. Neither was seriously injured.

**Surveys.**—The survey parties on all of the units were employed on routine work in connection with the drag-line and team excavation and furnishing lines and grades for the structure work. The party on the Northport unit was employed a part of the time on lateral location work and the preparation of earthwork quantities for advertisement.



*General.*—The board selected to review the Meeker-Conkling report on the water supply of the North Platte River in Wyoming and Nebraska, L. G. Carpenter, consulting engineer, of Denver, Colo., F. C. Emerson, State engineer of Wyoming, and E. A. Moritz, project manager of the Flathead project of the Reclamation Service, accompanied by Andrew Weiss, project manager of the North Platte project, made a trip of investigation over the territory covered by the report, starting on the 17th and finishing on the 26th.—*H. C. Stetson.*

*Project weather during August, 1920.*

Project.	Station.	Temperature, °F.			Precipitation (inches).
		Maximum.	Minimum.	Mean.	
Salt River.....	Phoenix, Ariz.....	108	64	86.5	0.75
Yuma.....	Yuma, Ariz.....	112	60	88.4	.62
Orland.....	Orland, Calif.....	111	56	81	.12
Grand Valley.....	Grand Junction, Colo.....	95	48	73.5	.64
Uncompahgre.....	Montrose, Colo.....	92	40	68.1	1.25
Boise.....	Boise, Idaho.....	107	42	72.2	.33
King Hill.....	Glenns Ferry, Idaho.....				
Mundaka.....	Burley, Idaho.....	101	32	69	.68
Huntley.....	Ballantyne, Mont.....	99	39	70.4	.78
Milk River.....	Malta, Mont.....	104	47	71	1.56
St. Mary storage.....	Near Babb, Mont.....	90	48	71	1.1
Sun River.....	Fort Shaw, Mont.....	92	37	65.2	.96
Lower Yellowstone.....	Savage, Mont.....	105	43	72.2	.96
North Platte.....	Wynote, Wyo.....	91	37	66.6	1.73
Newlands.....	Fallon, Nev.....	103	41	.....	1.9
Carlsbad.....	Carlsbad, N. Mex.....	99	52	.....	1.59
Rio Grande.....	El Paso, Tex.....	98	60	77	1.33
North Dakota pump- ing.....	Williston, N. Dak.....	102	43	71	.81
Umatilla.....	Hermiston, Oreg.....	101	40	71.3	1.24
Klamath.....	Klamath Falls, Oreg.....	100	38	68.9	.01
Belle Fourche.....	Orman, S. Dak.....	96	56	78.8	1.09
Strawberry Valley.....	Provo, Utah.....		39	.....	1.17
Okanogan.....	Omak, Wash.....	107	43	74.9	1.09
Yakima.....					
Sunnyside unit.....	Sunnyside, Wash.....	104	40	71	.91
Tieton unit.....	Cowiche, Wash.....	97	41	71.3	.43
Riverton.....	Pavilion, Wyo.....				
Shoshone.....	Powell, Wyo.....	92	35	67.2	.22
Indian projects:					
Blackfoot.....	Browning, Mont.....	88	36	67.5	.97
Flathead.....	St. Ignatius, Mont.....	92	38	65	1.30
Fort Peck.....	Poplar, Mont.....	104	40	75.3	1.64

NEWLANDS PROJECT, NEVADA.

Heavy rains on August 24 and 25 caused considerable damage to alfalfa hay and grain which had been cut for harvesting. This precipitation was reported as being the heaviest in 14 years.

On August 1, Col. E. E. Winslow, Corps of Engineers, United States Army, examined maps and records in the Fallon office preparatory to making a survey of the outlet of Lake Tahoe to determine the amount of work necessary to restore the outlet to its previous condition in order to permit drafts from the lake to relieve the water shortage prevailing in the Truckee River. Survey of the lake outlet was made by a party from the Fallon office from August 2 to 4 under the direction of Col. Winslow.

From August 4 to 8 the project manager was in San Francisco in conference with District Counsel E. W. Burr, representatives of Lake Tahoe property owners, and the attorney general of the State of California concerning work necessary at the outlet of Lake Tahoe to provide additional drafts from the lake to relieve the Truckee River water shortage.

The project manager made trips to Carson City, Lake Tahoe, and Reno in connection with matters for the relief of water-shortage conditions.

*Construction.*—Two short laterals, the Buck, and U<sub>A1</sub>, were practically completed during the month by Government forces. Eleven minor timber structures were installed in the lateral system, the majority of the same in the T District.

On August 25 bids were opened for the construction of the Gault Lateral, T system, between stations 51+05 and 157+76.4. Schedule I, involving 5,503 cubic yards of material, was awarded to Paul R. Jackson at 16 cents per cubic yard. Schedule II, involving 5,663.9 cubic yards, was awarded to D. H. Cashman at 16 cents per cubic yard. Schedule III, involving 5,322.5 cubic yards, was awarded to John C. Bell at 15 cents per cubic yard. Work on Schedules I and II was commenced shortly before the end of the month.

An outfit of 7 men and 2 teams performed minor cleaning work in the outlet at Lake Tahoe, commencing about August 11, in an attempt to secure a greater outflow from the lake. This work was intently watched by representatives of the Lake Tahoe property owners, with whom an agreement to perform certain work had been entered into.

*Settlement.*—The only settlement progress made during the month consisted in the acceptance of water-right applications on 6 tracts of private land, covering a total irrigable area of 461.2 acres. A large number of requests for homestead lands were received, which could not be satisfied as there remained only a few public-land farm units unentered on the plats.

*Water supply and use.*—The surface of Lake Tahoe dropped 0.42 foot from elevation 6,225.66 feet on August 1 to 6,225.24 feet on the last of the month. On August 22, with all of the outlet gates open, it was impossible to maintain power rates of 500 second-feet in the Truckee River at Floriston. Heavy rains over the project on August 24 and 25 relieved the necessity for irrigation water and were of considerable benefit to lands in the Truckee district which had been affected by the shortage. The dropping of the surface of Lahontan Reservoir caused the shutdown of the Lahontan power plant on August 10. It was impossible to operate this plant until August 25, when the heavy rains relieved the irrigation demand and made possible the delivery of water to the power plant through the Truckee Canal.

*Operation and maintenance.*—By the middle of August the lateral system was successfully cleared of the moss which had caused so much interference with operations. Cleaning and enlargement of the LB Lateral was completed, using drag line No. 3. Drag line No. 4 cleaned and enlarged the LD Lateral over a length of 7,033 feet. The S Line Canal banks were reinforced, using Government stock, for a distance of about 1,000 feet above the Hammond Drop.

Four minor timber structures were installed and eight similar structures were repaired during the month.

At the end of the month 1,973 head of stock were in the Carson Lake pasture.—*John F. Richardson.*

CARLSBAD PROJECT, NEW MEXICO.

The weather during August was generally cloudy and damp, with 1.59 inches of rainfall; there was very little hot weather except at the beginning of the month. The total run-off of the Pecos River for the month amounted to 14,950 acre-feet. The maximum flow was 630 second-feet on August 18, and the minimum flow was 60 second-feet for a short period.

Labor conditions on the project have been better than at any time during the season. This is due in part to the completion of the rush work of the cotton

crop and to the addition of new labor from the Mexican border in the anticipation of picking the cotton crop. There is a tendency for lower prices of farm labor on the farms.

There was an excessive demand for water during the early part of the month; the rain during the latter part of the month supplied moisture for row crops and the demand for irrigation water was materially decreased. A comparatively large force was working on the lateral system, cleaning weeds and grass. Two maintenance crews were at work throughout the month, employed principally on laterals. Copper sulphate was placed in open drains to kill a dense growth of algae.

The cotton crop made excellent growth during the early part of the month and was reported to be fruiting heavily all over the project. Frequent showers and much cloudy weather after the middle of the month caused excessive plant growth to the detriment of the proper fruiting of the plant. The crop generally, however, was in very good condition, and about 10 days behind the condition on the same date last season. The third crop of alfalfa hay has been harvested, and there was considerable hay damaged during the month. Shipments have been active, and the prices received have ranged from \$17 to \$21 per ton, depending on grade. The harvesting of the alfalfa seed crop was in progress during the latter half of the month. An estimate places the acreage in alfalfa seed at about 2,000 acres. The first thrashing made a yield of upward of 500 pounds per acre of clean seed. The sale of several lots of cotton of last year's crop was made at prices considerably less than those received on the project last season. These sales were made principally on the New Orleans market.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

Showers were frequent during August. One exceptionally heavy rain occurred in the Mesilla Valley, doing some damage to canals and laterals and damaging the crops to some extent over part of the valley.

The inflow into the Elephant Butte Reservoir was constant but light, ranging from 391 second-feet on the 1st to 900 second-feet on the 24th, making a total inflow of 39,841 acre-feet for the month. The decrease in storage in the Elephant Butte Reservoir was 106,569 acre-feet for the month, leaving a balance of 11,952,609 acre-feet.

Rain in the hills caused several floods in the Rio Grande below the reservoir which started the sand bars to cutting, with the result that the sand was carried into the canals and seriously interfered with the delivery of water. This is especially true of the El Paso Valley, where the capacity of the Franklin canal was reduced about one-third.

Maintenance work consisted mainly of removal of sand from canals and laterals. In the Hatch section the Rodey ditch was filled with sand for a distance of 250 feet twice during the month. In the Mesilla Valley the Las Cruces canal was filled with sand for a distance of 1,500 feet, and there was also some trouble in the Montoya canals, all caused by heavy rains. In the El Paso Valley the lateral banks are being treated with crude oil in an effort to kill the Johnson grass and other weed pests. Thirty-three miles have been treated and 3,000 gallons of oil placed. The heading of the Montoya canal was abandoned on August 23, due to sand conditions, and a new opening cut to the river. Wasteway No. 9 in the La

Union district has become so clogged with sand that it caused serious difficulty in the operation of the West Side system.

Cotton generally is doing well, and a good yield is expected. Eight hundred carloads of cantaloupes and 30 cars of pears have been shipped from the Mesilla Valley. Dan Kloss, of the Mesilla Valley, reports returns of \$600 from 1 acre of Irish potatoes. The Fruit Growers' Association of El Paso Valley shipped 30 carloads of pears and 15 cars of cantaloupes during the month, and in addition it is estimated that 10 carloads were sold locally. Ninety-five cars of alfalfa were shipped at a price averaging \$24 per ton, and 3 cars of wheat, at about \$3.90 per hundred.

W. J. Ball was transferred from Hatch to Las Cruces to replace C. A. Burns as superintendent of irrigation. Mr. Burns will be in charge of the construction work to be done this fall and winter at Elephant Butte Dam.

In the Rincon Valley construction work was carried on, on drainage only, a Monaghan 1-T excavator being used, excavating 12,300 cubic yards in a quarter of a mile of drain. A temporary arroyo crossing on the Rincon Canal was also installed. In the Mesilla Valley construction work progressed on drainage, four Government dragline excavators being operated, moving 122,881 cubic yards in 2.8 miles of drain. Preparations were being made for the reconstruction of the La Union lateral system, which work will be begun as soon as the irrigation season ends. In the El Paso Valley two draglines were operated throughout the month, both working on laterals with the exception of 10 shifts. Dragline No. 7 was working on the Playa Drain, which work was temporarily suspended until the Playa lateral and levee is completed, the machine moving to the latter work; 13,400 cubic yards were excavated from the Playa Drain, 39,500 cubic yards from the Island laterals, and 22,800 on the Playa lateral and levee.

J. L. Savage, designing engineer from the Denver office, arrived on the project August 7 and spent several days securing data for the design of the Franklin Canal headworks, the excavation and lining of the spillway channel at Elephant Butte Dam, and repairs to the embankment paving. Some construction work on these features is contemplated during the present year.

Upon the completion of the installation of the new liners in the balanced valves at Elephant Butte Dam and the inspection of the valves which have been in use during this irrigation season, it was found that the plugs had become so badly corroded that the metal was entirely pitted through. The new bronze liners installed before the irrigation season showed no pitting.—*L. M. Lawson.*

#### NORTH DAKOTA PUMPING PROJECT.

August weather conditions were extreme and unusual. Following the dry month of July some moisture was absolutely essential, but only 0.1 inch came until August 29, when 0.7 inch fell. This was too late, however, to be of material benefit to crops, and as a result the yield of all unirrigated crops fell off. Even the irrigated grain yielded several bushels per acre less, as grain does not develop well in heat and the drought was accompanied by higher temperature throughout the month.

Warm winds prevailed during the last week of the month. Precipitation was 0.81 inch, which was 0.5 inch less than normal and makes a total deficiency for the year of 0.76 inch.



Labor conditions continued even worse than in the earlier part of the irrigation season. As requirement for harvest help developed and extra high wages were offered, men grew more difficult to retain, and during the last few days of the season men had been switched from other essential work and were on 12-hour shifts to meet the power and pumping requirements.

The demand for irrigation water continued, but in an irregular and uneconomical load.

The power plant was operated for the commercial power contract: 84,150 kilowatt hours of energy were delivered to the city of Williston, which was 3,950 kilowatt-hours more than was delivered during the same month last year, and therefore represents a small permanent increase.

One thousand nine hundred and nine tons of coal were mined.—*Wm. S. Arthur.*

*Summary of employees for August, 1920.*

Project.	Beginning of month.	End of month.	Increase.	Decrease.
Yuma.....	219	270	51	
Orland.....	22	21		1
Grand Valley.....	85	90	5	
Uncompahgre.....	81	69		12
Boise.....	198	205	7	
King Hill.....	64	201	137	
Minidoka.....	105	120	15	
Huntley.....	108	49		59
Milk River.....	58	49		9
St. Mary storage.....	55	56	1	
Sun River.....	50	47		3
Lower Yellowstone.....	50	39		11
North Platte.....	475	489	14	
Newlands.....	73	62		11
Carlsbad.....	53	29		24
Rio Grande.....	100	415	15	
North Dakota pumping.....	65	45		20
Umatilla.....	32	32		
Kalmath.....	61	66	5	
Belle Fourche.....	106	77		29
Strawberry Valley.....	56	48		8
Okanogan.....	36	30		6
Salmon Lake.....	71	85	14	
Yakima.....	218	213		5
Riverton.....	43	44	1	
Shoshone.....	162	129		33
Denver office.....	73	78	5	
Blackfoot (not including one-half time of 8 employees on St. Mary storage).....	14	13		1
Flathead.....	195	140		55
Fort Peck.....	36	24		12
Field legal offices.....	24	25	1	
Washington office.....	93	94	1	
Unassigned personnel.....	33	35	2	
Examiners' force.....	3	3		
Total employees.....	3,417	3,392		
Increase.....			274	
Decrease.....				299
Net decrease.....				25

UMATILLA PROJECT, OREGON.

The chief feature of the month of August was the heavy rainfall; a total of 1.27 inches was recorded, which has only been exceeded for August during two previous years. Other conditions were normal.

*Farming operations.*—The harvesting of the second cutting of alfalfa was completed during the month, and in a few instances cutting of the third crop was begun. During the month 93 cars of baled and chopped alfalfa hay were shipped. Over 15 tons of honey and 1 carload of hogs were marketed.

*Crop conditions.*—Crop conditions are good. If the early rains continue there may be some difficulty in harvesting the third cutting of alfalfa. Land-develop-

ment operations are beginning for the fall, but it is not expected that any great area will be seeded.

*Labor conditions.*—Labor conditions were easy, due to the light demand. Farmers are complaining that in view of the lowering price for hay they can not pay the current rate of wages.

*Operation and maintenance.* The Feed Canal was not operated during the month. Total storage in Cold Springs Reservoir at the close of the month was 9,400 acre-feet. During the month a total of 12,498 acre-feet was delivered to the distribution system. The demand for water steadily declined throughout the month, and the storage which remains will be more than ample to finish the season. Fourteen to 25 second-feet and from 95 to 236 second-feet, respectively, were diverted by the Maxwell and A canals continuously throughout the month. The West Extension Main Canal diverted approximately 110 second-feet continuously throughout the month. There were no operation difficulties of moment. Maintenance work was confined to minor repairs to structures and canal banks and mossing. For the first time mossing operations have not been necessary on Canal A, due chiefly to the cloudy condition of the water. The betterments to Canal A which were done in the spring also contributed.

*Construction.*—Work accomplished on Canal A improvements during the month consisted of the raising of about 6,500 linear feet of lining on the lower side of the canal an average height of 1.5 feet, involving the placing of about 160 cubic yards of concrete. An average force of 14 men and 2 teams was employed. The pipe yard was operated throughout the month: 337 sections of 20-inch, 140 sections of 16-inch, and 495 sections of 12-inch concrete pipe were manufactured.

*Visitors.*—On August 3 C. S. Schofield, of the Department of Agriculture; Thomas F. Jardine, and Prof. W. L. Powers, of the Oregon Agricultural College; A. C. Cooley, in charge of agricultural work on reclamation projects; and A. K. Dean, superintendent of the Umatilla station, visited this office. On August 21, J. L. Burkholder, drainage engineer, visited the project in connection with drainage matters.—*Maurice D. Scroggs.*

KLAMATH PROJECT, OREGON-CALIFORNIA.

There was practically no precipitation during August, but in general the weather was favorable for the growing of crops. The farmers were beginning to cut the second crop of alfalfa. The grain harvest had commenced; several combined harvesters will be used this year in harvesting the grain crop, particularly on the Tule Lake lands. About 15,000 acres of Tule Lake lands were leased early in the year, the tracts averaging about 80 acres each. Practically all of the leased lands were planted to grain, and a good stand has been secured over the greater portion of the area. On some of the tracts the stand of grain is so heavy that some difficulty will probably be experienced in harvesting the crop.

The demand for water was quite heavy from the 1st to the 20th of the month. During the month 27,700 acre-feet of water were diverted to the farms. During the period of heavy water demand three crews were continually engaged in dragging the canals to remove algæ.

The Monaghan 1 cubic yard dragline machine was engaged all month on the construction of the Pettit drain; 5,286 feet of drains were constructed, which involved the excavation of 27,505 cubic yards of material. The high run for the month was 660 cubic yards in 7½ hours.

One survey party, consisting of an assistant engineer and three men, was engaged all month in making a structure map of the project and in general office work.

During the month preparatory work was in progress for placing about 1 mile of concrete lining in the C canal. Quarters and a mess house have been constructed to accommodate the construction forces and a warehouse built for the storage of materials. The water will be turned out of the C canal on September 6 and the placing of concrete will be commenced as soon thereafter as possible.

Pursuant to contract of February 24, 1917, work was begun on the construction of the Link River Dam by the California-Oregon Power Co. on July 29. By the end of August about 1800 cubic yards of rock had been excavated for the foundation and about 225 cubic yards of concrete had been placed.

Under the direction of the State highway engineer about 28 miles of highway are being constructed on the project. The surfacing material consists of crushed rock and gravel. Work was begun on the highways last spring, and good progress has been reported.

There has been considerable activity in the sale of farm property during the last two months; several transfers have been reported. In two of the transfers the consideration was in the neighborhood of \$50,000 each.

During the month the project was visited by United States Senators George E. Chamberlain and Charles L. McNary. The visitors were taken for a trip over the project and inspected the crops on the reclaimed Tule Lake lands.—*Herbert D. Newell.*

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

Weather during August was hot and dry. Only about 1 inch of precipitation fell.

Water was run in the canals continuously throughout the month. The demand was uniform, although not heavy at any time. Delivery through small laterals was difficult on account of excessive growth of weeds along banks and in some cases in the bottoms of ditches, but no crops suffered for lack of water. Since the canals were put in operation early in July there has been no disturbance to flow and no breaks or washouts. Water has been plentiful in the river throughout the season, and consequently no shortage has been felt under the Johnson Lateral and Inlet canal. It has been necessary to keep rather large field parties at work cutting weeds on small laterals in order to get the water through. This has been the principal work accomplished by the maintenance force during the month. Work was begun on tearing out old concrete and shaping up slopes on Inlet canal drop preparatory to making complete repairs. The hauling of gravel for this structure was let by contract and will cost \$2.75 per cubic yard at the drop. Work will be pushed on this structure as fast as men are available.

One field party of five men was engaged in survey work on the Willow Creek unit; 17.8 miles of level profiles were run, 10.2 miles of location surveys made, and 2,540 acres of irrigable area mapped. One of the rodmen has already gone and two more expected to leave shortly to enter school. The fourth will also leave for medical treatment soon and it is doubtful if a satisfactory party can be organized to continue the work so late in the season.

Crops in general are only fair. The alfalfa yield has been good, but bad weather caused a big loss on

the first cutting. All varieties of wheat except macaroni were badly affected by rust and made less than one-half crop. Oats were only slightly rusted and will make an average yield. Corn looks good where properly cultivated, and sugar beets will make a good yield, although not unusual. Live stock is in first-class condition, and no losses on account of disease are reported. Prices offered for cattle and hogs are considered satisfactory, but offers for sheep seem low. No price is offered for wool, and most of the clip has been consigned with a small down payment.

Labor is not plentiful yet, but there are indications that the supply will be adequate for fall work. The quality, however, remains poor.

Henry A. Cox, district counsel, from Mitchell, Nebr., arrived on the project the afternoon of the 20th and left on the 23d. While here he gave attention to certain legal matters in connection with suit for collection of charges, John P. Wilson, and trustees on right of way at Diversion Dam by T. J. Donahue. C. E. Piatt, examiner for the Service, arrived in Newell on the 29th of the month and left on the 1st of September. He spent the two days while here in the office with the chief clerk. *B. E. Handen.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

August was generally fair, with intermittent showers during the month. At the East Portal of Strawberry tunnel the precipitation was 3.15 inches, with a minimum temperature of 29° on the 30th. At Provo the precipitation was 1.17 inches, with a minimum of 39° on the 31st.

*Farming operations.*—The unusual precipitation during the month materially assisted the growth of all crops, although it interfered somewhat with the putting up of the second crop of alfalfa and the thrashing of grain. However, in spite of this obstacle the outlook of the grain crop is especially bright.

The peach crop is much below the average, due to the winter-killing of some of the trees and the heavy frost experienced on the 1st day of June.

The sugar-beet crop is above normal, with indications of an excellent yield.

*Hydrographic data.*—On the last day of the month the High Line canal was carrying 93 second-feet of water, and during the month 6,408 acre-feet were delivered to the High Line unit for irrigation purposes. On the last day of the month the Spanish Fork River was flowing 100 second-feet, and during the month 4,467 acre-feet of water were delivered to the five Spanish Fork canal companies. The Mapleton and Springville Irrigation District called for 2,217 acre-feet of water during the month. The total amount of water delivered during the month to all of the units in the project was 13,092 acre-feet, and the total water delivered during the irrigation season is 53,314 acre-feet, of which amount 47,365 acre-feet is water from the Strawberry Reservoir.

*Labor conditions.*—The scarcity of common labor is marked, and extreme difficulty has been had in obtaining an adequate amount of this class of labor. Skilled labor, on the other hand, has been plentiful and no difficulty encountered in obtaining it.

*Operation and maintenance, storage system.*—Operations at the West Portal in Strawberry tunnel will continue throughout the month, and camp betterments made and quarry operations commenced. Work has been somewhat retarded, due to the scarcity of common labor. Supplies and equipment are being hauled in.

*Operation and maintenance, power system.*—The power plant was operated without serious interrup-



tion throughout the month and power furnished to the towns of Spanish Fork, Salem, Payson, and Springville.

The alterations and repairs on No. 1 generator were completed on the last day of the month and the new unit put in on the line. The telephone line between Diamond Switch and West Portal has been entirely overhauled and the line placed in first-class condition. On the last day of the month the repairs were completed and the repair gang laid off.

*Settlement.*—During the month 25 water-right applications were accepted, 7 of which were new applications and 13 supplemental.

*General.*—Negotiations with the landowners of the proposed Santaquin pumping plant were continued, and on August 31 a petition was presented to the governor for signature.

The form of lease of the Strawberry grazing lands is ready for execution as soon as the divergent and conflicting views of the lessee and sublessee are adjusted.—*W. L. Whittemore.*

#### OKANOGAN PROJECT, WASHINGTON.

For part of August the weather remained extremely hot and dry, but near the end of the month an inch of rain fell on the project lands, with cool weather following, and at Conconully the rainfall amounted to 1½ inches.

Water was run for irrigation continuously during the month, with one general irrigation for all project lands, and a second run being started on a rotation basis with a small amount of water during the latter part of the month.

All of the emergency work has been completed except the well at the diversion weir, which will be finished early in September. All the emergency pumping plants were operated as continuously as possible during the month; interruptions were in all cases slight. The water in the reservoir was depleted at the middle of August, and since that time the project lands have been depending upon water from various other sources, together with the operation of the Robinson Flat pumping plant on the Okanogan River near Omak.—*Calvin Casteel.*

#### SALMON LAKE DAM.

The weather during August continued hot and dry until the 25th, when a rainy spell extending through the 29th gave a welcome relief and did considerable good to irrigated crops. On construction work two half days were lost on account of the rain.

Labor was not available locally in sufficient quantity for work in progress. Men were secured from near-by cities, but rates are higher, due to influence of harvest work, and men are restless.

On the Salmon Lake Road a steam shovel was worked one shift per day from August 1 to 8 and double shift from the 9th to the 31st. On account of a number of breakdowns to the machinery on the shovel, progress was very poor.

An elevating grader and team wagon crew were worked throughout the month on Salmon Lake Dam embankment construction.

At Conconully Dam 763 cubic yards of loose rock were excavated by hand from a trench 8 feet deep in the top of dam to provide footing for parapet wall.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for August was above normal and precipitation was light.

*Operation and maintenance, Sunnyside unit.*—Operation of the Sunnyside system was continuous throughout the month, with a heavy demand for water on account of the hot, dry weather, the average diversion into Sunnyside canal being approximately 1,240 second-feet. Water deliveries to the irrigation districts averaged as follows:

	Second-feet.
Outlook Irrigation District .....	46
Snipes Mountain Irrigation District.....	18
Grandview Irrigation District.....	36
Prosser Irrigation District.....	21
Sunnyside Irrigation District.....	50

*Tieton unit.*—Operation of the main canal and laterals was continuous and without unusual incident throughout the month. A few interruptions in service occurred on Unit 1, due to trouble with concrete pipes and wooden flumes. Demand for water was heavy, due to hot, dry weather. A rain of 0.43 inch on the 29th was of material benefit to the project. The maximum diversion from the river amounted to 311 second-feet, the average being 310 second-feet. Storage water was first required from Clear Creek Reservoir on the 14th. Maintenance work consisted of the usual routine of repair of pipe lines, removal of weeds, and repair and renewal of measuring boxes.

*Investigations and surveys for new units.*—No field work in progress. Work in the office consisted of preliminary plans and estimates for the Moxee unit. Estimate for excavation quantities was completed for the first 30 miles of the main canal, as well as estimates for structures for approximately 15 miles. Preparation of right-of-way maps for the canyon division of the Roza unit main canal was under way.

*Cooperative investigations, Pasco project.*—Soil survey was completed, and water measurements continued on lands under irrigation, in connection with cooperative investigations under contract with the State of Washington, to determine water duty and character of soil on the Pasco or Five-Mile Rapids project.

*Storage unit.*—A force of about 100 men and 25 teams was employed throughout the month at Lake Keechelus in hauling and piling logs in the reservoir area. Repair work begun the previous month on the spillway channel was completed, and cleaning of the outlet channel was in progress at the end of the month. About 225 tons of No. 1 timothy hay were harvested at Russell Ranch (Tieton Dam site), to be used for feeding Government stock during the coming winter.—*J. L. Lytel.*

#### RIVERTON PROJECT, WYOMING.

The temperature during August was about normal for that month. The precipitation was confined to local showers. Except after one or two of these showers the roads were in good condition for hauling.

Dragline No. 1 was operated two shifts throughout the month. Dragline No. 2 was operated one shift throughout the month. The total amount of excavation moved during August was 30,343 cubic yards, of which 2,545 cubic yards were excavated from outside the canal prism. Of the total excavation 29,838 cubic yards were class 1 material, being a heavy gravel, and 500 cubic yards were class 2 material, be-

ing a fairly hard shale, which was moved without blasting.

The construction of the telephone line from Riverton to the diversion dam was in progress throughout the month. About 14 miles had been completed at the end of the month. Telephone communication between the draglines and camp was established on August 13. One truck continued hauling and distributing poles throughout the month, while the other truck was hauling miscellaneous supplies to camp.

Work was continued throughout the month on the construction of a four-room cottage at Riverton and of a similar gatekeeper's cottage at the diversion dam.

Examiner of Accounts C. E. Piatt visited the project from August 25 to 28.—*H. D. Comstock.*

#### SHOSHONE PROJECT, WYOMING.

August was a normal month, with no excessive temperatures. During the last week of the month temperatures slightly below normal prevailed, and a light frost was reported on the 29th, but it did no damage to vegetation.

*Water supply.*—Shoshone Reservoir dropped slowly during the month, reaching the spillway elevation on the 30th. One of the balanced valves was operated from the 27th on. Stream flow near the end of the month was not sufficient for all water users, and storage was drawn upon.

*Operation and maintenance.*—The canal system was operated the entire month; 25,306 acre-feet were delivered to about 900 water users in 1,452 deliveries to irrigate about 44,000 acres of land. The total amount diverted from the Shoshone River was 41,884 acre-feet, at a maximum rate of 940 second-feet. Recaptured return flow furnished a considerable supply of water. Maintenance work consisted mainly of miscellaneous work and minor structures, riprapping and channel protection of various canals, and cleaning of moss, the growth of which caused considerable trouble on the principal laterals of the Garland Division.

*Crops.*—There was practically no crop movement during the month. Grain crops are being harvested and thrashed and are giving satisfactory yields. The second growth of alfalfa has been put up and the ground watered for the third growth. No market has as yet developed for alfalfa.

*Labor.*—Farmers were able to secure adequate help, but labor for drainage construction work was difficult to secure owing to the demand for it in the harvest fields and industries at Lovell. At the beginning of September \$5.25 per day was being offered.

*Drainage.*—On the Garland Division the Austin trencher worked on closed drain L-13, constructing 2,750 linear feet. The Lidgerwood continued on open drain X excavation, constructing 3,360 linear feet. The Monighan drag line continued on open drain 28 excavation, constructing 785 linear feet. At the close of the month a gasoline-driven Bucyrus drag line, transferred from the Rio Grande project, was being assembled for work on open drain 27. On the Frannie Division the Bucyrus drag line completed the Howell drain, excavating 3,115 linear feet, and moved to Deaver for minor repairs before commencing work on drain 102, west of Deaver.

*Field and office engineering.*—Field work was carried on by one survey crew on the Frannie Division and one on the Garland Division, the former principally on cross sectioning of the lateral system of the third unit of that division and the latter on drainage investigations in advance of construction. Office work was confined to routine.

*Settlement.*—Two vacant public farm units were entered upon during the month and one lot was sold in the town site of Powell.

*Construction.*—On the Frannie Division Government forces worked on two small systems for the recapture of waste water on the first unit and on the construction of the Frannie canal flume across Sage Creek and storm water culverts on the third unit of the division. On August 7 proposals were opened for six schedules of earthwork for the lateral system of the third unit of the division. Three schedules were awarded on informal contracts and one schedule on formal contracts. All contractors were at work at the close of the month and had moved 2,500 cubic yards of excavation. Government forces moved 600 cubic yards of excavation on the Albert Gillis suspended contract.—*J. S. Longwell.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

The weather during August was about normal and favorable for the work being carried on and for crops. There were no killing frosts up to the end of the month. The only construction work carried on consisted of the enlargement of the Two Medicine canal and the placing of a few minor structures on the Fisher Flats lateral system. The four systems of the project were operated during the month, a total of 992 acres being irrigated and 1,084 acre-feet being delivered to farms. There were no operation difficulties and only a small amount of maintenance work was done. On account of the favorable weather conditions crops made good growth, and at the end of the month the harvesting of wheat was well under way and the indications were that most of the crops were far enough along so that they would not be injured by frosts.—*R. M. Snell.*

##### FLATHEAD PROJECT, MONTANA.

McDonald Lake dam was completed. During August 200 cubic yards of back fill were placed around the spillway outlet and 260 square yards of paving on the face of the dam. Excavation of the Pab'o feeder canal was continued, with a total yardage for the month of 16,210, and work on Ashley Creek wasteway was begun. On the Mission A lateral system 45,000 feet board measure were placed in the 21 A lateral flume and 58 minor structures were completed. All construction was done by Government forces.

The number of acres irrigated was about 10,000, with about 14,000 acre-feet of water delivered.

The condition of the crops and live stock is good.—*N. B. Hunt.*

##### FORT PECK PROJECT, MONTANA.

The dry weather of June and July continued until the 28th of August, when a heavy rain occurred, and at the end of the month 1.64 inches of rain had fallen.

Construction work was continued on the Big Muddy unit with as many men as were available on the construction of checks, bridges, and turnouts. It has been almost impossible to obtain labor, as the farmers, railroad, and highway contractors are paying about 50 per cent more for common labor than the Service.

One field party was employed on farm-unit surveys and classification of lands.

Water was delivered to a small acreage under Poplar River and the Big Porcupine units. There were no demands for water under the Little Porcupine unit.



A large percentage of the grain crops has been harvested. The dry winds during the latter part of July and the first of August have reduced the yield to less than half of normal. —*R. M. Conner.*

#### GENERAL OFFICES.

*Washington office.*—Director Davis was in the field during the entire month of August. On August 3 he attended a conference in San Diego, Calif., with representatives of various interests in the Imperial Valley, to discuss action to be taken under the act of May 18, 1920, providing for examination and report on conditions and probable irrigation development of the valley. He attended conferences in the Denver office on the appropriation estimates and a meeting in the same city of the League of the Southwest. On August 10 to 12 he was in Portland at the annual meeting of the American Society of Civil Engineers, of which he is president.

During the absence of the Director the office was in charge of Morris Bien as Acting Director.

Chief Counsel Hamel left for the West on an official trip on August 8, and was still in the field at the end of the month.

The work of compiling and editing the material for the annual report was practically completed at the end of the month.

Among the visitors to the Washington office during the month were Señor Carlos A. Volpi, one of the principal engineers of the Irrigation Service of Argentina; Lieut. Herman Jansson, of the Swedish Royal Board of Waterfalls; Mr. Heiji Tachikawa, chief electrical engineer of the Inawashiro Hydroelectric Power Co. (Ltd.), Tokyo, Japan; and Mr. K. Okumura, civil engineer, with the same company.

*Denver office.*—Chief Engineer Weymouth returned to Denver on August 16, after attending the All-American Canal conference at San Diego, Calif. Assistant Chief Engineer R. F. Walter was in the office during the entire month except for a brief period of illness. Assistant Chief Engineer Charles P. Williams returned on August 5, after visiting the northern projects. On August 14 he left to meet the director on the Milk River project, returning to Denver August 23.

Official visitors were Director Davis, Project Managers Weiss and E. A. Moritz, Messrs. H. W. Bashore, H. A. Cox, F. A. Banks, and E. J. Willits. Other visitors during the month were Mr. Burchard, of the United States Geological Survey; former Gov. Ammons, of Colorado; Gov. Campbell, of Arizona; State Engineer McCune, of Colorado; and Mr. W. A. Beard.—*F. E. Weymouth.*

Are the rats and mice getting in your stored grain? All corn cribs and grain bins should be carefully inspected to see that they are rat and mouse proof. A concrete foundation for storage buildings is advisable whenever it is practicable.

Sheep scab often causes large loss because of a decrease in the quantity of wool produced, a loss in weight and general condition, and the death of many sheep. Although the disease is highly contagious and its effects severe, it can be easily cured.

## The Reclamation Record

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year, payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 14th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

### SUBSCRIPTION BLANK.

#### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

—, 1920.

CHIEF CLERK,

U. S. Reclamation Service,

Washington, D. C.

DEAR SIR: I am NOT a water user on one of the projects of the U. S. Reclamation Service, but wish to receive the RECLAMATION RECORD each month.

I inclose herewith 50 cents for a year's subscription, beginning with the current issue.

(Name.)

(Street number.)

(City and State.)

(Write Plainly.)

NOTE.—Mail the above blank TO-DAY. Send money order or New York draft, made payable to Special Fiscal Agent, U. S. Reclamation Service. Do NOT send stamps.

My congratulations on the good work you are doing in behalf of the water users on the several reclamation projects with the RECLAMATION RECORD. I assure you that I think the RECORD is indispensable. I read my RECORD and then hand it to my neighbor to read.—*From Burley, Idaho.*

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## DEPARTMENT OF THE INTERIOR.

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 ALEXANDER T. VOGELSANG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

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## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD LEGAL OFFICES.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement; R. M. Patrick, district counsel located at Burley, Idaho.

**Denver, Colo.** Law section office of chief engineer; E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.** P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, San River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.** Henry A. Cox, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.** H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr and J. N. Beardslee, district counsel, 349 Pacific Building. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauff, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Ballantine, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; C. C. Hoag, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—C. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. T. M. Culbertson, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melaaen, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. E. Kubach, chief clerk and fiscal agent; L. V. Branch, engineer, Conconully, Wash.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk; J. C. Thraikill, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; W. R. Elliott, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; L. H. Kline, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, acting project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—P. J. Preston, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppelebaum, chief clerk; E. M. Philebaum, fiscal agent.

## INDIAN PROJECTS.

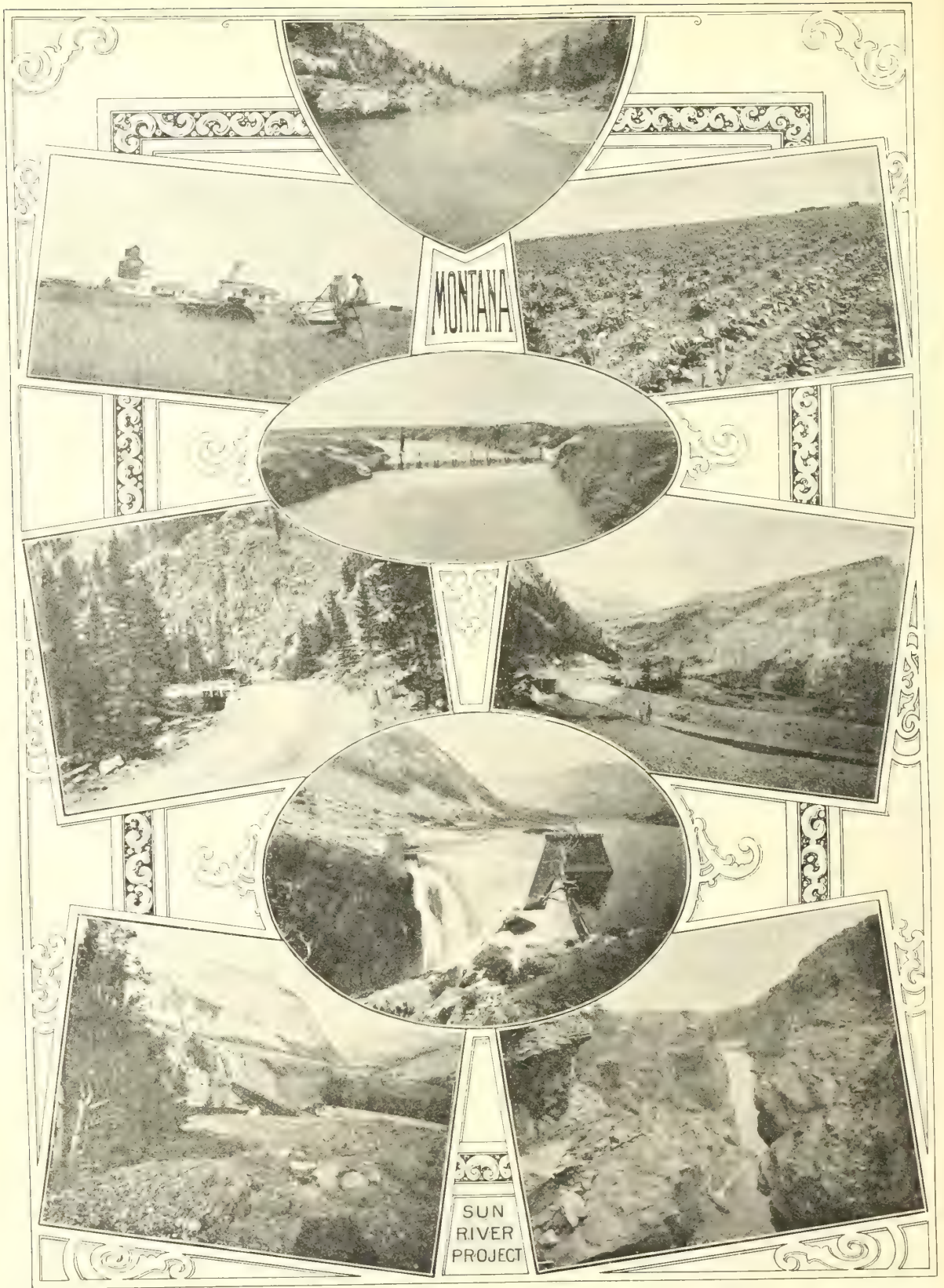
**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk and fiscal agent.

**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

WORK AND SAVE. BUY GOVERNMENT SECURITIES.







# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURE INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

VOLUME 11, No. 11

PRICE NOTHING FOR OUR WATER USERS.  
FIFTY CENTS A YEAR FOR OTHERS.

NOVEMBER, 1920



WATCHFUL WAITING





FLATHEAD PROJECT PICNIC.

1. Lined up for the start. 2. Some of the women. 3. Some of the men. From left to right: F. F. Smith, engineer; J. P. Siebeneicher, fiscal agent; N. B. Hunt, office engineer; E. A. Moritz, project manager; J. M. Swan, cost keeper; Thomas H. Payne, timekeeper; Young Moody, assistant engineer; J. E. Cushing, bookkeeper; C. J. Moody, irrigation manager; C. F. Williams, purchasing agent; C. H. Pratt, chief of party; C. S. Peters, property clerk; John W. Lambert (rear), garageman; C. H. Dexter, water master; N. G. Murray, timekeeper; E. L. Decker, water master. (See p. 519.)



## USE OF ELECTRICITY IN RURAL COMMUNITIES ON THE MINIDOKA PROJECT.

By Howard H. Douglas, Assistant Engineer, U. S. R. S.

THE power system of the Minidoka project now supplies service to approximately 3,000 consumers of whom 1,100 are farmers. To reach these people the Reclamation Service has installed substations, and distributing companies have built 290 miles of 2,200-volt circuits of which over 250 miles are in the country.

The farmers are usually supplied by a stock company which is organized and incorporated as a mutual power company. There are 20 of these farm companies supplying approximately three-fourths of the rural consumers. The remaining one-fourth are supplied by lines connected to the systems of the different towns, with the exception of about 40 farmers who are supplied direct by the United States on individual contracts.

The Reclamation Service wholesales the energy to the farmer companies on the Minidoka standard maximum demand rate, which is in general use on all power contracts with the United States on the Minidoka project. This rate is based on a charge of \$2 per month per kilowatt of maximum demand for the equivalent of the first 50 hours' use of the maximum demand for the month; 3 cents per kilowatt hour for the next 50 hours' use of the maximum demand; 2 cents per kilowatt hour for the next 50 hours' use of the maximum demand; 1 cent per kilowatt hours for the next 150 hours' use of the maximum demand; and  $\frac{1}{2}$  cent per kilowatt hour for all energy used in excess of 300 hours' use of the maximum demand. The rate also provides for a block discount based on the contractor's guaranteed maximum demand, increasing from 2 per cent for 2-kilowatt contracts up to 30 per cent for a contract of 100 kilowatts or more. In addition to this a discount of 10 per cent is allowed wherever energy is delivered and measured at 2,200 volts. In operation this rate gives the contractor an opportunity to get very cheap energy if his load factor can be kept high by the proper use of different electrical appliances. Some of the rural companies have built up their load factor to such an extent that there have been months when their average cost per kilowatt hour for energy has been as low as 1.6 cents.

The different factors in the operation of the farm company make a very interesting study. It has been found that improvement of the load factor usually comes with the growth of a company and is largely due to the diversified use of electrical appliances. The energizing current of the farmers' transformers floating on line is an item that improves the load factor. The diversity factor also increases with the number of consumers and with the increased use of different appliances. The demand factor improves as the connected load is increased. It is interesting

to note that load tests show that the companies' peak load is always at the time of the lighting peak. The individual farm consumer usually has a day peak, and it usually averages about three times his average night peak, but the diversity of the day load among the different consumers is such that their individual maximum demands do not affect the companies' maximum demand. The companies' evening peak is three to five times greater than the day load.

The power factor of these rural companies is seldom above 50 per cent except during the evening lighting peak. Power factors have been observed on the rural companies as poor as 20 per cent. This is usually during the period from midnight to morning, with practically no active load except the energizing current of unloaded distribution transformers. Tests indicate the average power factor for the day to be close to 30 per cent. This low power factor is a condition which will improve as the load develops.

Data have been compiled on the distribution losses of some of the farm companies and it has been found that their losses in kilowatt hours usually run from 30 to 50 per cent. These losses are caused principally by energizing current of the transformers. Losses can also be attributed to the line loss proper and at times to leakage from line to ground through contact with trees.

Perhaps one-half of the rural lines are built with iron wires for conductors. Iron was used to a great extent for construction during the war because of the high price of copper. Iron has not been used except where the load is light. Where load enough has developed to justify the substitution of copper, this has been done. Most of the companies buy copper when extensions are built, replacing the iron nearest the source of supply and using the iron conductors taken down for branch circuits and extensions. A number of the companies are using three-phase construction for their main feeders and single phase for the branch circuits, balancing the load by balancing branch circuits.

The Unity Light & Power Co. is the largest rural company on the project. This company was organized during the year 1917, and service connection was first made in October of that year when the company began supplying 40 consumers on 8 miles of line. Their growth has been steady until at the present time they serve 165 farmers on 38.5 miles of line, comprising 13 miles of 3-phase No. 6 copper wire, 3 miles of 3-phase No. 8 iron wire, 3 miles of single-phase copper, and the remainder single-phase iron. Their connected load is 250 kilowatts, which is carried by 200 kilowatts of distribution transformers. Their maximum demand has reached 41.6 kilowatts during the past sea-



son Their maximum use of energy occurred during the month of April, 1920, when 10,920 kilowatt hours were delivered from the Unity substation to the company's feeders with a recorded maximum demand for 35.2 kilowatts, which gives a load factor of 43 per cent.

The demand for rates on rural lines to care for larger consumers has brought out a number of very good distribution rates. A number of these rates have been especially devised to encourage the cooking and

water-heating load. The rate adopted by the Rural Electric Co. west of Rupert is characteristic of the different rate schemes and is as follows: Five cents per kilowatt hour for the first 25 kilowatt hours, 3 cents per kilowatt hour for the next 125 kilowatt hours, and 1 cent per kilowatt hour for all over 150 kilowatt hours. This rule also provides for a minimum charge of \$1.25 per month.

Electricity for lighting purposes is always used wherever service has been obtained. In addition the

FIGURE 1

GROWTH OF RURAL LINES AND CONSUMERS

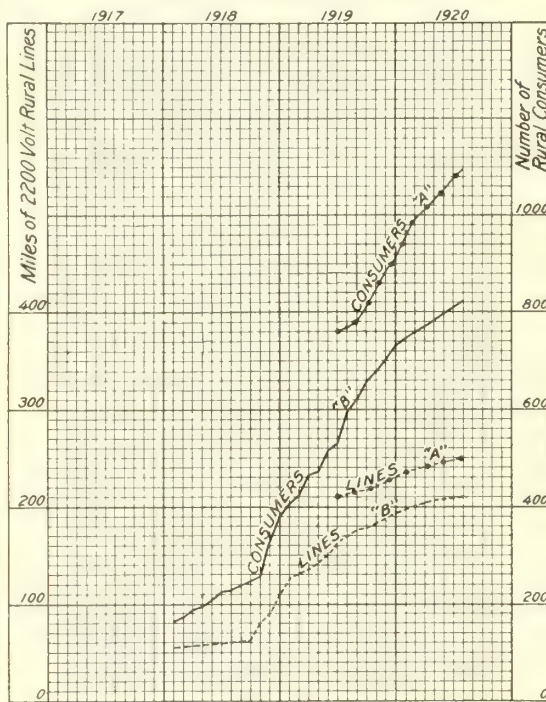


FIGURE 2

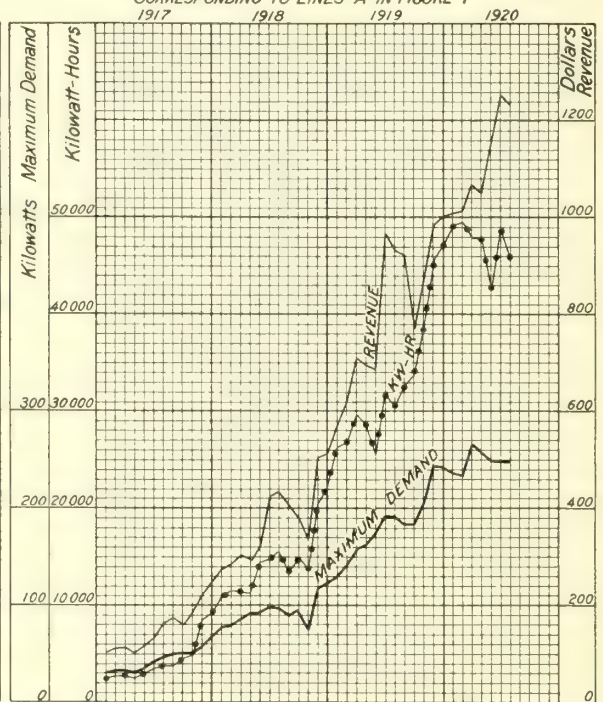
GROWTH OF REVENUE AND LOAD ON RURAL CIRCUITS  
CORRESPONDING TO LINES "A" IN FIGURE 1

FIGURE 3

REVENUE DATA RURAL CONSUMERS

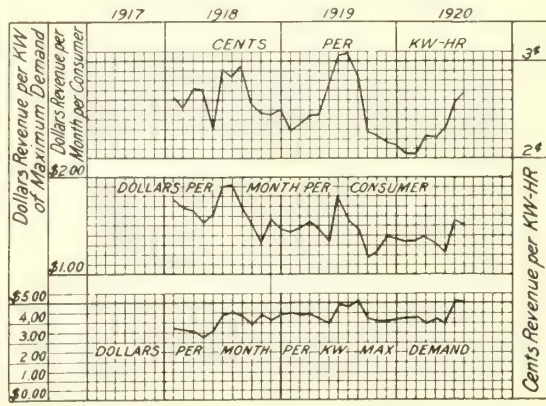
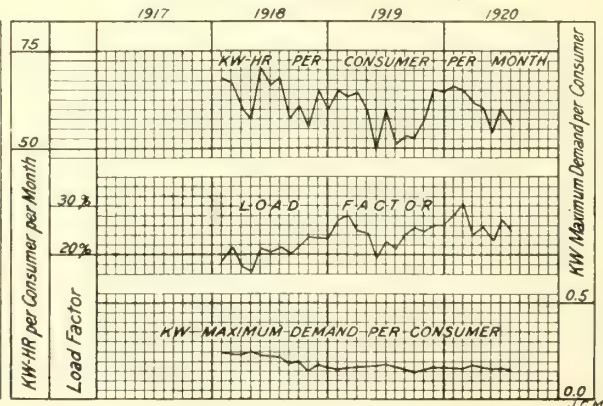


FIGURE 4

LOAD DATA RURAL CONSUMERS



farmer, and especially the farmer's wife, are using electricity for a great diversity of purposes, and the history of a progressive farmer's installation shows that his use of energy increases as rapidly as the purchase of different appliances can be financed. The electric iron is the most popular of all appliances, and the records show that over 75 per cent of the rural consumers use the iron. The washing machine is perhaps a second choice, and, in spite of their high price, over one-third of the farmers' wives are washing with electric washing machines. Electric cooking appliances are just beginning to come into popular use on the rural lines. A few ranges have been used for several years, but it has only been during the past year that most of the companies have developed rates to care for this class of business. A large increase in the cooking load is expected during the coming year.

Rural distribution, Minidoka power system, calendar years 1918 and 1919.<sup>1</sup>

	1919	1918	Per cent increase during year.
Miles of 2,200-volt distribution lines, Dec. 31.....	196	98	100
Number of consumers, Dec. 31.....	731	376	91
Annual maximum demand, kilowatts (sum of substation peaks).....	245.12	125.75	95
Kilowatt hours delivered at substation (year).....	395,124	174,974	126
Annual load factor.....	18.4	15.9	15.7
Hours use of maximum demand, monthly average.....	177	153	15.7
Annual revenue to U. S. Reclamation Service.....	\$9,751.06	\$4,576.32	113
Annual revenue per consumer (wholesale).....	\$17.25	\$19.48	-11.4
Annual revenue per kilowatt (wholesale).....	\$39.75	\$35.90	10.7
Average revenue per kilowatt hour (wholesale).....	\$0.0247	\$0.0262	-6
Average kilowatt monthly maximum demand at substation per consumer.....	.33	.41	-20
Average kilowatt hour at substation per consumer per month.....	58	62	-6

<sup>1</sup> This table does not include data on any rural consumers supplied from the systems operating in Rupert, Burley, Heyburn, Paul, and Albion, in all approximately 200 rural consumers, on which energy sales data have not been obtained.

Vacuum cleaners, electric incubators and brooders, and many other labor-saving devices are coming into more general use. Considerable energy was used during the past spring in homemade brooders, which were equipped in many cases with a carbon-filament lamp to supply the necessary amount of heat to keep the little chicks warm. Many a farmer now has a motor belted to a jack shaft, which drives a pump, cream separator, grindstone, feed grinder, and numerous other appliances for labor saving. In pumping water for stock purposes, electricity saves a great amount of labor. This is especially true in the large sheep camps during the winter season. Small irrigation and drainage pumps are also increasing in number. One-half of the farmers have a large yard light on a pole, and

with all these burning at night it is difficult to tell from a distance where town begins and country ends. A survey of the connected load on the commercial circuits of the Reclamation Service as of January 1, 1920, shows over 25,000 lamps in use of capacities varying from 5 to 1,000 watts, and totaling nearly 1,500 kilowatts. The following list gives an idea of the large number of appliances of various sorts that are in service. An interesting feature is the great preponderance of appliances of a practical labor-saving character:

Electrical appliances in use Jan. 1, 1920, not including those classed as lights, motors, or heaters.

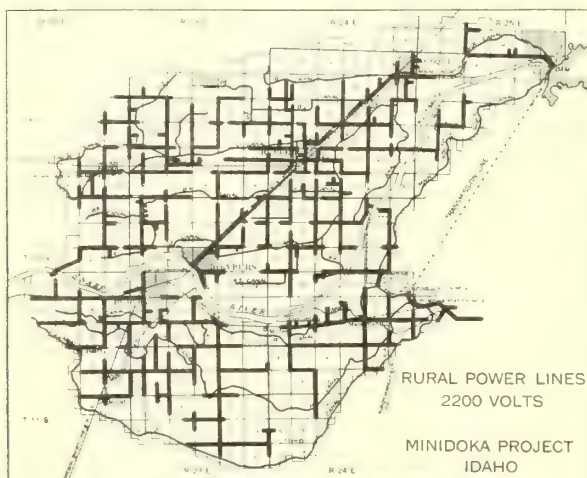
Item.	Number.	Watts.	Increase during 1919.
			Per cent.
Flatirons.....	1,862	1,024,100	44
Washing machines.....	875	144,375	145
Hot plates, grills, toasters.....	551	363,275	15
Motors smaller than 2 horsepower.....	325	198,700	33
Vacuum cleaners.....	265	26,500	168
Ranges.....	198	1,066,270	60
Fans.....	184	19,155	17
Water heaters.....	145	276,700	43
Percolators.....	107	53,000	26
Sewing machines.....	77	3,850	103
Air warmers.....	59	59,600	.....
Heater pads.....	43	2,580	11
Curling irons.....	36	720	12
Adding machines.....	28	3,135	.....
Vibrators.....	26	1,300	34
Coffee urns (restaurant size).....	21	20,530	.....
Sterilizers (surgeon's).....	18	44,180	.....
Moving-picture machines.....	16	40,000	.....
Bake ovens (bakery size).....	7	72,000	.....
Miscellaneous.....	298	168,015	.....
Total.....	5,141	3,588,405	54

Seventy per cent of all farmers along the lines are taking advantage of electric service, and over one-half of the remaining ones own shares of stock in the lines running along their places, but have not as yet been financially able to wire their places and buy equipment.

The growth of the rural distribution of electricity is shown graphically by the accompanying charts. Two curves are given for the number of consumers receiving service and two for the length of lines serving them. The ones marked "B" indicate the number of consumers who receive their supply of energy either from strictly rural distribution companies or as individuals on small contracts direct with the United States. It is only for these cases that it has been found convenient to get load data from which the load and revenue data curves are plotted. The curves marked "A" include the additional rural consumers (and the length of circuits necessary to reach them) who are supplied by extensions from city system. Other curves show the results of the operations and growth of business. It may be noted that the average earning per kilowatt of maximum demand is on the increase. The decrease in use of



energy per consumer is no doubt due to the rapid addition of new consumers. It is found that the average connected load of the rural consumers on the project at the close of the year 1919 was 2 kilowatts, as compared with 1.5 kilowatts for the year 1918.



The map of the project will give an idea of the widespread use of electric service by farmers. Rural electric service is one of the great attractions of the Minidoka project. The farmers having electrical service can not say enough of the advantage of the use of electricity on the farm.

### RECLAMATION RECORD PRICE INCREASE.

Owing to the increased cost of printing the RECLAMATION RECORD, it has been found necessary, in line with the action taken by practically every other publication in the United States, to make a moderate increase in the price to subscribers.

Announcement is therefore made that *beginning January 1, 1921, the subscription price for the RECLAMATION RECORD will be 75 cents per year. The price for new subscriptions and renewals of old subscriptions received before January 1, 1921, will remain at 50 cents per year.*

We regret the necessity for this increase, but feel sure that the ever-increasing value of the RECORD to the farmer, the irrigation engineer, and to others interested generally in the subject of irrigation will more than justify the moderate increase in price.

As heretofore, the water users on our projects will receive the RECORD free.

Many a piece of farm machinery is broken in use, at a busy critical period, because the part has become weakened by rust.

### SAVING REPAIR BILLS ON FARM IMPLEMENTS.

By the U. S. Department of Agriculture.

THERE is a saying that the first use of an implement is the best use. It is as trite as the saying that a new broom sweeps clean; but it is just as true.

Do you recall the whirr of the mower the first time you drove the cutter bar against the grass? Or the way the new plow glided through the loam, turning over an even furrow with apparently no strain upon the horses?

Is it a pleasure or otherwise to get out the machinery for the second season and find joints rusted, working parts clogged, and the implement partially unfit for use because of having been put away without care, or left out in the field during the winter?

Possibly you were tired and imagined you were too busy for any extra work when you finished using the implement last season; but wouldn't you give a good deal when you are in a hurry to begin plowing or harvesting if the tools were in the same condition they were when you got them from the dealer?

Farming implements necessarily wear out, but it is foolish waste in this time of high prices to make a donation to the elements by neglect, and it is foolish to allow good implements to deteriorate because of the breakage or wearing out of parts that could be replaced if taken in time.

If you will go over the equipment of an ordinary farm you will find dozens perhaps hundreds, of items that cause delay and financial loss at critical periods which can be avoided by a little care at the right time. A friend visiting a water user on one of the reclamation projects commented on the neat appearance of his grounds and the orderly arrangement of the implements in his sheds and barns.

"It looks as if you spent all your time just in straightening up and repairing," he said.

"Very much otherwise," replied the water user, with a smile. "Keeping my material in order takes only a very small part of my time; but I do it as soon as I see it should be done. When I was a small boy and used to work in the house garden, my father trained me never to put away a hoe without cleaning off the dirt and polishing the blade; never to leave grass or dirt on a rake; never to throw down so much as a stable fork carelessly, but to stand or hang it up; never to leave a bit of harness, so much as a halter, mussy.

"When I grew big enough to handle the cultivator and shovel plow, I was taught to keep the bolts tight and the blades clean and to grease any parts which were likely to rust. If a cutter section or a working part of a mowing machine got out of order, I was taught to fix it at that particular time, or as soon afterwards, as I was able to do so.

"I've been careless sometimes. Once I left a corn harvester out in the field because the hired man had broken his leg; after I had taken him to the house and spent one or two days helping the doctor fix him up, I forgot all about it. It cost me \$25 to get that harvester in shape the next year. But I've seen men who complained that repair expenses ate up their savings just when they needed them at the beginning of harvest, when a little care at the right time would have given them a balance on the credit side of the ledger. 'A stitch in time saves nine' is a pretty good saying. It doesn't exaggerate one bit—that is certain."



A few hours' work would provide shelter here.

Some question has been raised as to the extent to which housing should be provided for farm implements. In dry regions, such as are occupied by many of the reclamation projects, of course, it is not necessary to build the tight, weatherproof sheds which are advisable in New England. Nevertheless, it is best to err on the right side. It looks much better, to say the least, to see the seed drill, the mower, the reaper, and the gang plow under shelter, even if it is only a tarpaulin, than to see them out in the weather. The sun will frequently do serious damage by blistering and warping, even if there is no rain or snow.

Plows, harrows, cultivators, and hand implements should never be put away dirty. It takes only a little time to clean them up. If you can't do it when you are through with them, make a note of it and attend to it the first idle day.

The general impression prevails that the plow, for instance, is a simple tool, requiring little adjustment and less care. This is far from the truth. More effort has been expended in the slow process of development of this seemingly simple tool than in that of any other implement on the farm. Careful study of its construction, adjustment, and use will be amply rewarded in greater efficiency. This useful imple-

ment should not be permitted to remain in out-of-the-way places subject to deterioration by weather conditions, but should be housed properly when not in use. When laid by, it should be stored in a dry place away from contact with the ground, and the bright parts coated with grease to prevent rust. Once the mold-board, share, and landside have become pitted with rust, a good job of plowing can not be done until the corroded parts have again acquired a polish by use. Sulky and gang plows, of course, require mechanical attention. Directions for their care can be obtained from manufacturers and dealers, and are the subject of a special bulletin by the United States Department of Agriculture, which can be had on application for Farmers' Bulletin 946. There are two other Farmers' Bulletins which may be obtained at the same time: 947, on the care of mowers, reapers, and binders, and 1036, on the care of grain separators.

Undoubtedly many mowing machines are scrapped annually which might be capable of doing several years of useful work if only a small percentage of their original cost were expended upon them for repairs at the right time. At the end of a season's work with any machine it is a worth-while plan to make out a schedule of needed repairs and adjustments for that particular machine and send for the needed parts as soon as possible. Then attend to them at the first opportunity. Under no consideration leave the machine in a fence corner. It represents capital, and there is no use expending capital on the weather.

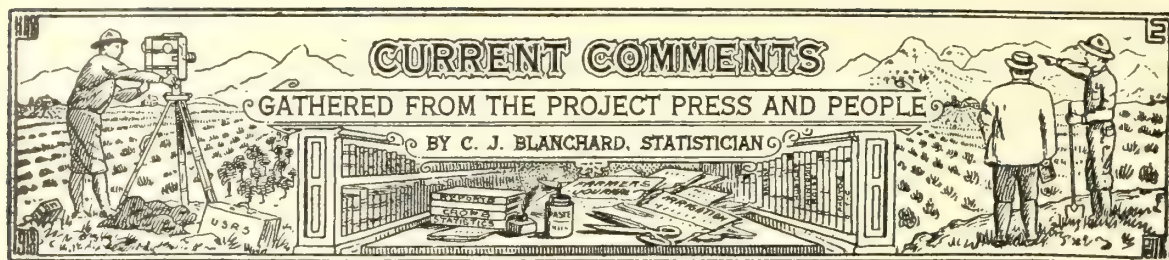
When putting away the mowing machine see that the knife bar is left clean, wiped with a greasy rag, and stored in a dry place. Also place a block of wood or other support under the middle of the tongue to keep it from sagging. If stored with the cutter bar in a vertical position, place a block of wood under the shoe to take the weight off the frame. All accumulations of macerated vegetable matter, dirt, and grease should be removed and the bright parts oiled and greased.

The binder will require more careful attention, but the details will suggest themselves with a little study. Look the implements over carefully, and where a part needs adjustment or replacement, attend to it while the matter is fresh in mind and you have time to do it.

Housing is a matter of judgment and depends to some extent on the climate. A good many farmers in warm or dry sections leave their implements out or merely cover them with a tarpaulin. Tarpaulins are all right at times, but they are a bad habit. They are apt to blow off, and when they get torn they often don't get repaired. And they make a good nesting place for mice.

If the ground is damp for any considerable part of the year get some kind of a floor under your implements or block them up. And if you build a shed for implements keep it in repair.





**C**OOPERATION among the farmers in each district or section was never more needed than at this time. Organizations formed to stimulate the production and marketing of the crops best adapted are proving very successful on a number of our projects. Under the direction of the Farm Bureau on the Rio Grande project a number of subsidiary associations were formed to handle special crops, and these organizations now handle pears, peaches, cotton, cantaloupes, cabbages, hogs, and chickens and eggs. The managers market their products generally direct and eliminate the local middleman entirely. A steady

growth in all lines and good prices have resulted. The fruit and potato growers' associations on the Yakima project have proven most helpful to members, and the new hay growers' association recently sold 5,000 cars of hay in one sale and saved the farmers a quarter of a million dollars. These few examples of many that could be cited should set our farmers to thinking. The agricultural community to-day which is unorganized in the matter of markets is at the mercy of conscienceless middlemen, who reap where they have not sown. This speedy elimination means better prices for both farmer and consumer.

NOTED HERE AND THERE.

*Colorado, Grand Valley project.*—During the latter part of August, 25 carloads of fruit moved out of Palisades, Clifton, and Grand Junction daily. Up to September 9 1,086 cars of potatoes and fruit had rolled on their way to the eastern markets. The big peach crop and the apples had not yet started, but an estimate of 300 cars for the farmer is made.

*Colorado, Uncompahgre project.*—Cheering indeed are the crop reports from Colorado Western slope, and from these reports we glean nothing but gladness from the Uncompahgre. The potato crop is bigger and better, alfalfa has turned out a heavy hay crop, and grains are way up in yields. A surpassing fruit crop is reported from the big Ashenfelter orchard and a number of others, so that the faith of the orchardists is going to be rewarded. Sugar beets have made a heavy growth this year, and the factory will grind a lot of sugar this fall and winter. All is well on the Uncompahgre.

One of the biggest wheat yields recorded and reported so far this season is that on the Gus McColloch ranch. This crop was thrashed recently, and from 8 acres a total of 579 bushels were secured, or at the rate of 72½ bushels to the acre. This yield was made on river bottom land in potatoes last year and is sure a good one. The wheat is of No. 1 quality and tests very high, and will command the highest price in the market.

*Idaho, Minidoka project.*—Jess Matthews, who is farming the Eames ranch in the Emerson district, has the distinction of raising the largest crop of barley in

this neighborhood and perhaps tops the list in the State. He thrashed 107 bushels of the grain per acre recently. This was planted from certified seed on measured ground and weighed out. The quality of the barley is of the very best.

The harvesting of cereals was practically concluded on October 9. Grain is either in the stack or safely stored in granary and elevators. The year 1920 will be remembered as one of the best in the history of the project judged by crop yields, good health of stock and people, and freedom from severe storms and untimely rains. Digging of spuds and beets and cutting and stacking of the third crop of alfalfa are in full blast. The tall smokestacks of the sugar factories throughout the valley are belching out black clouds of smoke, and at night the big plants are aglow with innumerable electric lights. Ceaselessly night and day from this time on the huge grinders will operate until the 6,000 acres of beets are converted into sugar for the markets of America. Along the railways at the dumps endless caravans of trucks and beet wagons are tumbling thousands of tons of beets into the pits from which they are raised electrically into cars for delivery to the factory. The splendid graveled highways present a never-ending procession of vehicles carrying alfalfa to the meal mill, grain to the elevators and mills, and potatoes to the waiting refrigerator cars. The earth has responded bountifully to man's skill and industry, and the Nation's stomach is promised satisfaction.

Reports of wonderful yields from all over the lower Snake River Valley are coming in. Many are astound-

ing. Here are a few of them, and more will be reported later: Richard Greenwell, of Paul, reports one field of wheat yielding 85½ bushels per acre and another of 75 bushels. Most of this was sold for seed, and was of the Dicklow variety. Another Paul ranch records 250 sacks, or 500 bushels, of spuds per acre, and a certified crop at that. Personally, we saw two fields where the potatoes were running from 225 to 300 sacks per acre, and sold for seed away above the market price. Beets are reported as going as high as 25 tons per acre, and contracted at \$12 per ton. So it goes with oats, barley, onions, peas, and beans. Alfalfa is a whale of a crop, and the browning haystacks thickly dot the wide landscape. Here is winter forage for thousands of cattle, sheep, and hogs.

It was a wonderful picture we gazed upon this morning standing across the canal near Paul and looking east to Rupert and the Albion hills and south to Burley. On the summit of Mount Harrison a recent fall of snow glistened like silver in the pleasant sunshine, the slopes showing the dusty green of sage and juniper. A network of canals wound in and about the broad plain, silver threads in fields of golden stubble, and broad squares of deep green alfalfa. Farm homes and fine barns and outbuildings enshrined in groves of poplar and cottonwood on every 40 or 80 acres presented a vista a stranger would surely never look for in a region which in 1907 was virgin desert. The picture seemed like a mirage, a transportation of a great farming district of the level prairies of Illinois or Iowa. But for the beautiful mountains all about one could easily believe himself back in the Mississippi Valley, where farming began in 1863.

When you looked a little longer and in detail viewed the panorama you recognized that it was not Illinois or Iowa, rich and fertile as they are. No Hawkeye or Sucker ever raised such quantities of hay on such small areas as here were revealed. Nowhere in those States at this season could you find this tonnage of succulent green hay and another crop just ready for the mower. In pastures of blue grass and clover grazed hundreds of sheep, cattle, and hogs. The air was clear as the ether of the blue sky, and our view encompassed 60,000 acres, with practically not a vestige of desert in sight. It was a restful scene that breathed prosperity and progress to the onlooker. To this once uninviting desert in 1905 a little band of engineers and surveyors came. With transit and level they marked the lines of canals and laterals, laid out the highways, and located the railway and the town site. Soon after came the contractors. Camps sprang up in the sagebrush, giant shovels dug deeply into the virgin earth, horses and fresnoes followed on the lesser ditches. Meanwhile, on the river a great dam and power house had been constructed, and waters, which for centuries had passed idly on to the sea, were turned, divided, and

again divided until each plot of land had been connected and could receive the precious floods. Far up in the fastnesses of the sky-reaching Tetons more engineers labored to create a wonderful storage reservoir to restrain the spring floods for the summer needs of the distant valleys to the west. Settlers poured in from every State, sturdy, adventure-loving men and women imbued with the spirit of conquest and the love of home. Inch by inch they fought back the desert, and each year the evidence of their industry was revealed in a broadening vista of grain and alfalfa, in windbreaks of rapidly growing trees, and in better types of homes. This was the story, the miracle we visioned as we stood entranced before this morning's picture. Upon the dusty breast of mother earth, here in Idaho's great desert, man has set a picture the like of which no human artist will ever set upon canvas.

Now turn with me toward the north and northwest. Soaring into the clouds the serrated peaks of the Sawtooth range rim a horizon a hundred miles away. Between us lies a wide stretching desert of sagebrush, the home of great silence, a manless land. Unquickened by irrigation it must always remain a scene of desolation and the home of the jack rabbit and the coyote. Yet we who know and love the desert are cognizant of the fact that when waters now wasted are stored, when engineers have once more appeared upon this scene, this desert like the one which existed just across the canal behind us will disappear and its silence will be broken by the sounds of industry and the laughter of happy children. A hundred thousand acres, each 40 acres of which is capable of supporting a family in comfort, lie there to-day valueless. I would it were possible to bring every one of our national lawmakers to view the scene as it unfolded to our eyes. They can never visualize it from any written word. But here and on every reclamation project of the Government and on many private enterprises they could find unanswerable arguments for extending national aid.

As an evidence of the fine cooperative spirit of the farmers of the Paul district it is a pleasure to record the recent purchase of 80 head of cattle, the famous Kountze Holstein dairy herd of Buhl, at a gross price of \$10,000. The average earning of this herd last year was \$184, not including increase in calves.

Paul folks are aiming for a big milk condensary in the near future, and with the knowledge of the Paul spirit we predict its early establishment.

Rupert and Burley continue to grow more and more civilized. Stores are well stocked, there is much activity in building, and civic improvement is under way everywhere. As usual financial conditions are tight just before a presidential election, but this is only temporary in a country just garnering its biggest harvest. The decline in farm prices as yet is out of line with the prices of what a farmer buys. But



clothing, sugar, and coffee have declined. There is an easing up in labor costs and in a few lines of implements and hardware the cost to the farmer is slightly lessening. The farmer complains, and rightly, that the slump hit him first and hardest, and with a withdrawal of opportunity to borrow money he has been unable to hold his crops. The result has been a glut on the market and a corresponding decrease in prices. The potato slump hit the farmer a hard blow. As high as \$10 a day is paid for pickers, and with spuds bringing only 90 cents a hundred, and sacks at 18 cents each, only the best tilled fields can show any profit at all. Of course many are storing their crops and may find better prices in the spring. Many millions of dollars are needed right now in the West to relieve this situation. Who can unloose the coffers of wealth in the East for this need? It would relieve the feeling of widespread discontent now prevailing among the tillers of the soil if the means could be found to make short-time crop loans possible. The present condition is being made the most of by an army of agitators working in our farming districts and is adding to the ranks of the radical element in these communities.

*Montana, Flathead (Indian) project.*—Polson is to have a new potato warehouse. The building is to be 48 by 80 feet and will be large enough to store several carloads of vegetables. It is to be built of lumber but will be entirely frost proof, as the walls, floor, and ceiling will be filled with sawdust. It is to be erected on the site of the F. L. Gray warehouse at the docks, making it easy of access, either to boats or the railroad.

Work has been started on a new building for the Polson Creamery. The new building will be 30 by 50 feet and will be used for the creamery equipment entirely.

The building will be built of hollow blocks and bricks with a concrete floor, and when finished will make it one of the best creameries in the State. The present boiler room will be converted into a power room for the cold-storage plant machinery and enough more storage boxes will be erected to about double the storage capacity of the plant.

*Nevada, Newlands projects.*—En route from Salt Lake to Fallon we pulled in to Lovelocks, where a bronzed son of the soil got on and joined us in the smoker. He pointed out the widely scattered haystacks and commented lugubriously on the erratic Humboldt, which has practically been dry for three years. The rich hay meadows of the Lovelocks Valley were certainly few in number. He said, "I was over at Fernley the other day while the appropriations committee was holding a meeting. One of the farmers made a speech denouncing the delay in settling up the Tahoe storage questions. Why," said the Lovelocks chap, "do you know that geezer actually wept in his whiskers because, as he said, the water

supply was so short he didn't cut more than half what he should have in his third cutting. Say, stranger, if we Lovelocks farmers could have cut half a crop in our first and only cutting once in the last three years we would be happy. Gosh, but it takes a lot to satisfy some folks. I cut 80 tons on 160 acres, and that's a lot more than my neighbors got. I'm looking for a Government water right right now."

We have looked again upon Nevada's reclamation project. From Fernley in the west down into the Island district and over to Stillwater we made our way, crossing wide fields of grain and alfalfa and chatting with many busy farmers. A very different atmosphere pervades Lahontan Valley to-day from that of three years ago, and it was very pleasant, indeed, to note the change. The day of fault finding is over. Our farmers are looking forward, not backward, and a very marked change for the better is everywhere in evidence.

Most impressive progress has been made in the Island district. Thousands of acres, for many years given over to pasture and weeds, have been turned under and the grain and hay fields are on every hand. Charlie Renfrow, tireless, know-how worker, has worked a miracle on a part of the old Douglass ranch. Wingfield ranch is a splendid example of what can be done by intelligent farming. Pinger brothers have a beautiful ranch. On the Jarvis ranch we found an orchard loaded with fine apples.

The Stillwater district, including many Indian farms, is going ahead rapidly. Upon the Fernley bench, the garden spot of Nevada, we ate our fill of luscious grapes and peaches on the Mason ranch and spent a pleasant hour with Billy Rawles, the reformed reclamation engineer, who operates an alfalfa ranch of 120 acres. Billy admitted that if his third cutting averaged up with the others he might have to rent a piece of land for stacking it. Down by the river we looked over a wonderful herd of Herefords and some exceptional fine sheep on the Morgan ranch. Later in the week we saw a lot of prize ribbons on this stock at the Sacramento State Fair.

Back in Fallon we met the new board of directors of the drainage district and read their report, which recommended the equitable apportionment of drainage costs. From now on we look to see the Newlands project forge to the front as it should have long ago. One grievous trouble remains to be removed, and that is the tangle over Tahoe storage. The farmers are strenuously demanding that the matter be taken to the courts without further delay. They want to know once and for all where they stand. The land for which there is water will be rapidly improved now that the vexing question of drainage is in the way of being settled. Fallon is making great strides and a number of large and attractive store buildings of brick and stone are replacing the frame structures of pioneer days. The homeseeker who is looking for moderate-priced land in a region of equitable climate

with good soil and markets will do well to look over the Newlands project. We shall have occasion this winter to stress this point in the RECORD. It was gratifying to find a number of Boise farmers taking hold here. Much of the beautiful land on the Lahontan bench, recently offered by the Southern Pacific, was gobbled up by them.

*New Mexico-Texas, Rio Grande project.*—Nine hundred and forty carloads of cantaloupes have been shipped out of the valley. There will be only a few more carloads, and most of the commission firms have left for the season.

It has been a successful year so far as quantity production is concerned.

Eleven carloads of apples have thus far been shipped out by the Mesilla Valley Fruit Association under the management of the Dona Ana County Farm Bureau, with very gratifying results.

The first car of Jonathan apples marketed was sold in Chicago and brought \$2,341.50, which, according to C. H. Weaver & Co., who are placing the product, is the biggest price ever paid for a car of Jonathans.

In the last two years \$12,000 worth of eggs have been marketed through the Mesilla Valley Poultry Association, which is a subsidiary organization of the Farm Bureau Marketing Association.

The members of the association have, during the past two years, received on an average 5 per cent more for their eggs than nonmembers, showing how valuable organized marketing and selling is.

The poultry business, the way it is now organized in the valley, can not be overdone, and every farmer should make an effort to go into this branch of farm work more extensively.

The association candles and grades all eggs and has established a name and demand for Mesilla Valley eggs.

An organization known as the Farm Bureau Marketing Association has been organized in Dona Ana County, the incorporation papers have been filed with the State corporation commission, and the corporation is now a going concern. The authorized capitalization is \$100,000.

Although this is a stock concern organized under the general corporation laws of the State, it will be strictly a nonprofit-sharing institution, run for the sole benefit of its members who are shipping through the concern.

Its intention is to form a medium through which the farm bureau can operate in establishing markets for the varied farming interests of the valley.

The marketing association will also take over the management of the Mesilla Valley Fruit Association, the Mesilla Valley Cotton Exchange (now in process of formation), the Sweet Potato Growers' Association, the Mesilla Valley Poultry Association, and will serve the interests of all other organized lines of production as occasion may require.

*Oregon-California, Klamath project.*—Klamath, the land of wonders, natural and man made, never looked better than as we saw it in September. What a wonderful country is this. Its contrasts are striking. On the one hand the heavy sagebrush desert and a step beyond the tules grow luxuriously in the marsh. On one side the familiar desert mountains carved with sage and juniper, on the other side a range covered with magnificent pine and cedar. Lakes of wonderful beauty and charm, rivers of sparkling clearness, and springs of enormous volume. On the southern rim of the basin the lava beds, Capt. Jacks' famous stronghold, full of tall chimneys, gashed by deep fissures, and with many dark and forbidding caves in which ice forms in the summer. Where else in this land of ours can you find another spot like it? Another time we want to tell the story of our last visit to this project, and with pictures try to convey to you some of its charm. Let this suffice for the time being—Klamath is distinctly and emphatically on the map, and Klamath Falls is going strong with it.

*Washington, Yakima project.*—The reorganization of the Washington Hay Growers' Association is meeting with wonderful success. The organization includes Kittitas, Yakima and Benton Counties.

General manager J. N. Price and Vice President J. M. Comparet have been conducting a series of meetings throughout the valley, explaining the work of the association.

The association has closed the contract with the United Dairy Association of Washington to supply them with the hay for 60,000 head of cows. This will mean a minimum of 5,000 cars of hay. The deal will approximate about one and a half millions of money.

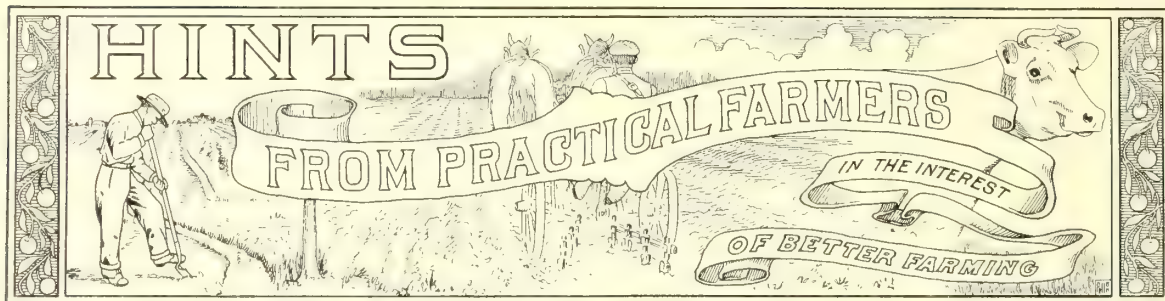
The direct negotiations of these two large associations, eliminating the profit of the middleman, is one of the largest deals ever consummated in the West, and means a saving to the growers of a quarter of a million and to the dairy interests even more.

The untiring efforts of the officers of the association in completing the organization for the benefit of the growers is meeting with the hearty approval of the bankers and business men throughout the valley.

Eighty thousand dollars' worth of Bartlett pears was handled in the Yakima Valley through the Growers' Service Co., according to Ira E. Cleveland, manager. The pears were sold to various canneries, the 1,000 tons going at \$80 a ton.

That made the price 4 cents a pound, and the growers had none of the trouble of packing. All the growers had to do was to pick the fruit; even the lug boxes for handling it were furnished. A Bartlett pear orchard this season, even with a fairly light crop, promises to be worth more than the average apple crop. On account of the shortage of peaches, the canneries demanded an exceptionally large amount of pears, and were willing to pay high prices for them.—C. J. B.





### Don't Breed Ewe Lambs.

MUCH has been said against the practice of breeding ewe lambs, according to R. B. Millin, sheep specialist of the University of Idaho extension division, and but little has been said or can be said for it. The best flockmasters and shepherds severely condemn it.

The attempt to breed ewe lambs usually results in partial failure. In most cases not more than 50 per cent of them get with lamb. Those that do get with lamb are stunted by the demands of the lamb before and after birth for nourishment, which the ewe herself should have for her own full development. The first lamb is usually small and puny and fails to make the quick growth so desirable because of its weakness at birth and the inability of its dam to provide sufficient nourishment.

Ewes bred as lambs seldom attain their full development. As a result they are undersized, do not produce a full clip of wool, fail to produce the strong, lusty lambs that are a good shepherd's pride and joy, as well as the basis of his financial returns, are not able to produce the large quantity of milk so essential for good lambs, and often are lacking in the maternal qualities which prompt thrifty, well-grown ewes to own and take good care of their lambs.

### Essentials of Animal Breeding.

A new Farmers' Bulletin, recently issued by the United States Department of Agriculture, tells the basic facts about heredity and how live-stock improvement may be brought about. Under the title "Essentials of Animal Breeding," this publication places before farmers and stockmen information which heretofore has been available chiefly in books, many of them being of technical character.

Topics explained and illustrated by the new bulletin include: Beginnings of life, evolution, Mendel's law, determination of sex, inbreeding, crossbreeding, outcrossing, pure breeding, pedigrees, grading up, and maternal impressions. Certain popular but incorrect ideas about heredity are discussed.

Several series of pictures show how good blood "breeds on" and likewise how inferior parents stamp

undesirable characteristics on following generations. The discussions deal with all the principal classes of domestic animals, and a summary of basic principles concludes the bulletin, which contains 40 pages. Copies may be obtained free of charge by application to the Division of Publications, United States Department of Agriculture, Washington, D. C.

For experienced breeders and for others who desire more detailed information than that contained in the Farmers' Bulletin, the Department of Agriculture is preparing another bulletin entitled "Principles of Live-Stock Breeding," which goes more deeply into the subject. This literature, prepared in connection with the "Better Sires—Better Stock" campaign, adds to the completeness of the series of Government publications pertaining to live-stock raising. In fact, the department is now prepared to furnish interested persons literature on practically all problems of live-stock production and improvement.

### Storage Diseases of Apples.

Storage diseases take a heavy annual toll of the harvested crop of apples, greatly reducing an important food supply and increasing the cost and uncertainty of marketing operations. The responsibility for this loss may lie with the orchardist, the transportation company, the dealer, or the storage management.

The diseases may be due to the work of a parasite or to the direct action of unfavorable conditions upon the fruit itself. Diseases like scab and certain rots that are definitely traceable to the action of particular fungi are called parasitic diseases, while bitter-pit, water-core, and scald are known to be wholly due to abnormal physiological conditions in the fruit itself and are called nonparasitic or physiological diseases. Both these classes of diseases can be prevented largely by proper methods of growing and handling the fruit, but each has its own peculiar laws of behavior upon which the requirements for its control must be based.

Delay in warm packing sheds or cars shortens the natural life of apples and greatly increases their tendency to rots and to scald. Filling the storage rooms so rapidly that cold-storage temperatures can

not be maintained has a similar bad effect. Apple rots are slow to start at a temperature of 32° F., but if a beginning has been made at a higher temperature they proceed much more rapidly.

Ventilation is as important as low temperature in the prevention of scald. Apples that receive good aeration when delays occur in handling them do not have their tendency to scald increased by the delay. [Any ventilation of the storage room that results in an actual renewal of the air within the package is of great value in scald control.] Apples scald far less in boxes, baskets, or ventilated barrels than in the usual tight barrel. Wrapping apples in oiled wrappers furnishes the most complete protection against scald.

Write to the Department of Agriculture, Washington, D. C., for a copy of Farmers' Bulletin 1160, Diseases of Apples in Storage.

### Warnings Concerning Farm Leases.

A clear and equitable lease contract is of prime importance to both tenant and landlord, yet because of the difficulties involved in drawing up such a contract to fit a given case, tenants and landlords alike often are content to use some easily available printed form that may or may not be best suited to the conditions. In Farmers' Bulletin 1164, "The Farm Lease Contract," the United States Department of Agriculture urges farmers to make sure that their leases say just what they ought to say and mean just what they were intended to mean.

It is pointed out that custom often tends to perpetuate a long-established type of agreement, even though conditions do not continue to justify the terms involved. For example, the stock-share lease, almost universally framed on the fifty-fifty basis, with the landlord furnishing the land and the tenant furnishing the labor, work stock, and equipment, is not necessarily equitable. Land and labor vary in relative value, and what might be an equitable ratio upon which to base division of returns in one case might be altogether unsatisfactory in another. It is urged that an adjustment should be made in each individual case, taking into account the relative value of the elements contributed by the contracting parties. The following described method is suggested for making such an adjustment:

#### ESTIMATE SHOULD BE MADE.

"First an estimate should be made of the fair value of the use of the land and of the value of ordinary farm labor, with additional estimates of the cost of horse labor and the annual cost of the use of equipment. The value of each of these items may be determined with a fair degree of accuracy in advance. The ratio of the two values should be determined, and all other expenses and receipts should be divided in

the same proportion. Suppose, for instance, that the fair value of the use of the land for a year is found to be \$500, while the fair value of the farm labor, horse labor, and use of equipment is \$1,000. The ratio of these quantities is 1 to 2. The landlord should, then, pay one-third of all other expenses and the tenant two-thirds. After these other expenses have been deducted from the total receipts, the landlord should receive one-third of the remainder and the tenant two-thirds."

Thus the receipts will be divided in exact proportion to the value of the contribution of the parties in fulfilling the contract.

#### "STOP, LOOK, AND LISTEN."

In the following series of questions, designed to serve as a sort of "Stop, look, and listen" warning to farmers who have to do with lease contracts, the authors of the bulletin summarize the main points to be taken into account in drawing up a farm lease:

"Is it so written that its meaning will be clear at any later time?

"Is it fair to both parties?

"Does it give the tenant a reasonable opportunity to make a comfortable living and to get ahead?

"Does it require proper and conservative care of the premises leased?

"Are all desired reservations to the lease made?

"Are the things stated which each party is to do and to contribute?

"Does it make clear the rights and privileges of each party?

"Does it define the relationship between landlord and tenant and provide for the settlement of differences of opinion?

"Does it contain a statement of the procedure to be followed when the relationship of landlord and tenant is to be terminated?

"Does it contain the following essentials to a legally complete lease?

"1. The date it was made.

"2. The names and the final signatures of the contracting parties.

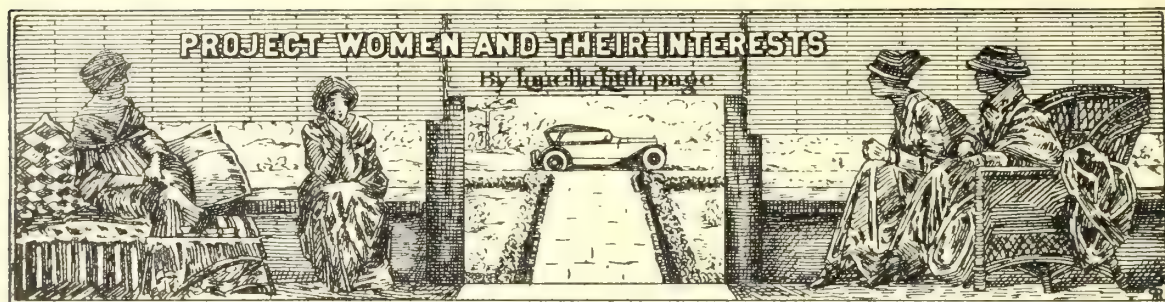
"3. The period for which the lease is to run.

"4. A description of the property leased.

"5. An agreement in respect to the amount of rent to be paid and the time when and the place where it is to be paid."

Out of 753 farmers owning motor trucks in 11 Eastern States who answered a recent query of the United States Department of Agriculture 95 per cent said they believed the use of trucks would show a profit. Preference leaned toward a 1-ton truck. Bad roads were the principal drawback mentioned.





## THE SCHOOL LUNCH.

(Continued from October issue.)

**S**UPPLIES.—The furnishing of supplies is a problem which will be solved according to special conditions in each community. Staple supplies, such as cocoa, sugar, flour, and seasonings, may be stored at school. Many reports state that the perishable supplies are sent from the various homes. This sending in of supplies should be systematized, families taking turns according to the number of their children having lunch at school. In some schools the children bring individual supplies each day, but this means a tedious routine of daily attention to a small matter. In a district where all supplies can be bought, parents sometimes prefer to have the children bring the money and have the supplies bought by the pupils who are in charge for the week. This usually, of course, in town or city schools.

Whatever system of furnishing supplies is used, an account of the daily cost of the lunch should be kept. A price list of the various supplies should be available for reference, and children bringing in perishable foods may be given credit for these at prevailing market prices. In this way a record of the per capita cost of the lunch is obtained whether the children bring money for it or not.

*Division of work.*—The children, both boys and girls, large enough to work may be arranged in groups or committees of four or six, each committee taking the work in turn for a given time, usually a week, and each committee should be composed of older children with younger ones to assist. In a committee of six, two may prepare the lunch, two prepare the table or desks for the meal, and two wash dishes, the duties to rotate among the members of the group. These duties may be outlined in detail on sheets or cards and the directions so carefully worked out that little verbal instruction is necessary after the pupils have studied the sheets assigned to them. On Friday, say, the teacher may write on the board the food to be served each day of the following week. If the pupils are to supply materials, those who are to do so should be given slips stating exact

amounts of what they are to bring. It will be necessary to remind the pupils each evening who are to bring next day's supplies. This plan relieves the teacher from much detailed work and teaches the children to work together and to look upon the lunch as their own project. The teacher will, of course, supervise the lunch and see that good housekeeping is practiced.

*Serving.*—The lunch may be served cafeteria style, each pupil passing before the serving table to receive the prepared dish; otherwise the lunch may be served at each desk. Paper napkins may be used under the lunches.

*Clearing away.*—Dish washing and clearing away afterwards offer good lessons in sanitation and general cleanliness. Those cooking and clearing away should wear aprons, and the committee for the week should look after the weekly laundering of the dish towels. Dish cloths and towels, however, should be well washed each day and hung out to dry. *Dish mops should not be used.* Scrub cloths should be included in the equipment. This is to avoid the possible use of the dishcloth for wiping off tables, chairs, and dusty surfaces, a most insanitary practice and a frequent one. The oil stove needs careful attention, the wicks trimmed and cleaned to preserve a smokeless flame. The room should be kept neat and clean, and should be well aired to clear away any lingering odors of cooking.

## Reclamation.

By Julia M. Martin, Spokane, Wash.

Season soiled by the wind-blown sand,  
Grim and gray with unfruitful age,  
Over the grudging western waste  
Grazes the flock of the scattered sage.  
Slowly we drive it back, and back,  
And where the sterile sand blows now  
Woman shall sing as she binds the rose,  
And plenty follow the peaceful plow.

Where silent sage-ewes lately roamed  
 The smoke of an evening hearth shall curl,  
 And boughs prolific in bloom shall part  
 To frame the face of a laughing girl.  
 Where nude winds warred with the restless sands  
 The fruitful tree shall governed grow;  
 And where the rattlesnake raised its head  
 The voice of the prattling child shall go.

### Boys' and Girls' Club Work.

The Glenn County Farm Bureau Monthly, published on the Orland project, California, devoted considerable space to an article in a recent issue to boys' and girls' club work which every farmer should read. It was rather startling news received in Washington not long ago that there are still a few sections on the Government reclamation projects where such club work is not being carried on, for it is generally recognized that the farmers on these projects are among the very foremost and up-to-date agriculturists in the country.

"What is the idea and purpose of the boys' and girls' club work? In a great many instances it is misunderstood," says the editor. "First of all, a boy or girl enrolled in a club does not have all his or her time taken up by the work. To illustrate: The club member buys a pig; he takes care of that pig in the best possible way, but he does not have to stop his work in the field to do it. There will not be a round of festivities for the club member, but he will simply acquire a businesslike manner. At the end of the club work he can either sell his pig or keep it to start a herd. The purpose of the club work is to keep farm boys and girls interested in the farm business."

There are prizes offered by various pure-bred breeders' associations, by banks, and other organizations to keep up lively competition, but primarily the profit that the club member makes on his pig and the knowledge he receives from his own experience shows him that farming is a good business; he acquires confidence in himself, learns the practical application of knowledge gained in school, and develops a comradeship with his parents.

In the case of the pig club the boys and girls get the best gilt that pure-bred breeders raise. As in the case of all the other club work it is a business proposition, and the farmer who encourages his boy or girl to join one of the clubs and helps in keeping up their interest will find he has made partners of his children, instead of indifferent dependents who are eager to get away and into any kind of employment which makes them independent.

#### WE WONDER.

WE WONDER why  
 MANY FARMERS do not treat  
 THEIR BOYS AND GIRLS as partners

IN SOME farm project  
 AND GIVE THEM SOME inducement to  
 BECOME INTERESTED in  
 WHAT GOES ON at home.  
 BOYS are human and  
 GIRLS too, and the  
 PRIDE OF OWNERSHIP is  
 STRONG in them just as it is in  
 THE OLDER FOLKS,  
 AND IF a boy or girl has  
 A REAL INTEREST in 10 sheep or 2 cows  
 OR A quarter of an acre of apples  
 OR a pure-bred pig  
 THAT does not become  
 DAD'S sheep or  
 COW or  
 APPLES or  
 PIGS when they are sold  
 WE BET they would work harder  
 AND find out new things  
 FOR THEMSELVES and take  
 MORE INTEREST in the farm  
 AND DECIDE that it  
 ISN'T SO BAD after all,  
 AND IF we want our  
 BOYS AND GIRLS to quit  
 FLOCKING to the cities we ought to  
 SHOW THEM WHY the  
 FARM IS better.  
 DON'T YOU WONDER how it  
 WOULD WORK hard enough to  
 TRY IT OUT?

Apologies to K. C. B.

### How to Get More Eggs in Winter.

To the women who depend largely upon their poultry for pin money, the following article from the Glenn County Farmer, published on the Orland project, California, will be of great interest:

"Why don't the hens lay?" We hear this question on every side these days. There doubtless are a number of reasons for this apparent idleness. But maybe we are not doing our part, either. Or maybe we can do a little more than our part and bring about a better state of affairs.

What about the house we keep our hens in? Is it drafty? Does rain sift in? And do we provide clean litter.

All of these points greatly affect egg production. But perhaps one of the greatest factors, and by some authorities it is considered the greatest factor, is feeding for winter eggs.

The egg is made up of different substances, and unless these are available in the ration the egg can not be produced. The yolk is largely fat, and this is abundantly supplied by the grains. But the white is largely protein, and grains do not supply this need, so the hen must have something which provides it. Milk or meat scrap or tankage will suffice.

Then, too, the hen must have something to manufacture shells out of, so be liberal with the box of oyster shell in the corner of the scratch pen. Green food is essential, too. A head of cabbage, beets, carrots, potatoes, or turnips may be used with good results. The following is a satisfactory balanced ration for 100 hens per day:

Grain—10 pounds of corn, 5 pounds of oats.

Three pounds of bran, 3 pounds of shorts, and 1½ pounds of meat scrap or tankage.



The grain can be fed as scratch feed and the other feed mixed and fed as dry mash. The meat scrap or

tankage will be unnecessary if the hens are given 3 gallons of buttermilk each day.

### Reclamation Record Cook Book.

#### NUT BREAD.

By A. H. Gullickson, chief accountant, Washington office.

1 cup walnuts                      1 teaspoonful salt.  
1 egg.                                3 cups flour.  
1 cup sugar.                      4 level teaspoonfuls baking  
1 cup sweet milk                      powder.  
Let stand one-half hour.  
Bake one hour in slow oven.

#### PINEAPPLE DELIGHT.

By Lydia H. Meisel, private secretary to chief engineer, Denver office.

Boil one-half cup rice.  
Dissolve one-fourth package Knox gelatine in little cold water, add to warm rice, then add 1 cup shredded pineapple, 1 tablespoonful sugar, and 1 pint whipping cream. Let stand in cool place.

#### BATTER BREAD.

By Jessie Biglow, Uncompahgre project, Colorado.

Beat three eggs, yolks and whites separately. Add to yolks 1 scant teacupful of meal, 3 cups of milk, one-half teaspoonful salt, and stir well. Then add whites of eggs, 2 heaping teaspoonfuls baking powder if sweet milk is used; if buttermilk or sour milk is used, use soda in proportion of sourness of milk. Two tablespoonfuls melted lard. Should be quite thin. Pour into buttered baking dish and bake.

#### GOLDEN CORN CAKE.

By J. E. Sullivan, stenographer, Denver office.

Mix and sift three-fourths cupful corn meal, 1½ cupfuls flour, one-fourth cup sugar, 5 teaspoonfuls baking powder, one-half teaspoonful salt. Add 1 cup milk, 1 egg, 2 tablespoonfuls melted butter. Turn into buttered shallow pan and bake in hot oven 25 minutes. White or yellow granulated corn meal can be used in this recipe.

#### ESCALLOPED CHEESE.

By E. F. Baker, assistant engineer, Denver office.

1 cup grated cheese.                      ¼ teaspoonful mustard and  
3 eggs.                                      sprinkle of Cayenne.  
1 teaspoonful salt.                      4 slices buttered bread cut in  
2 cups milk.                                      cubes.

Beat eggs, add seasonings and milk. Arrange bread and cheese in alternate layers in baking dish. Pour on custard. Let stand 10 minutes, and bake 20 or 30 minutes in a moderate oven.

#### BUMPLINGS THAT NEVER FAIL

By Mrs. D. L. Henderson, Loma, Grand Valley project, Colorado.

Beat an egg in a cup. Fill this with sweet milk and put in a pinch of salt and 2 teaspoonfuls of baking powder sifted in 2 cups of flour, or enough to make a stiff batter. Drop from spoon in any good broth and boil for 15 minutes—lid on.

#### HOMEMADE PORK SAUSAGE.

By E. E. Roddis, district counsel, Denver office.

Pork to be a little over half lean.  
For 10-pound quantity:  
3 ounces salt.                      1 heaping teaspoonful of  
1 ounce sage (powdered)                      ginger.  
1 ounce pepper.  
Heat the ground meat until warm and mix in the spices by hand.

#### SEA FOAM.

By Mrs. M. Lamb, Accounting Division, Washington office.

2 pounds brown sugar.                      ½ pound nut meats.  
3 egg whites.                                      1 teaspoonful vanilla.

Beat whites of egg until very stiff.  
To the sugar add enough water to dissolve, and cook until it strings (not too much). Then pour this sirup slowly into the stiffly beaten whites, beating constantly. Add flavoring and nuts when it begins to stiffen, and drop with spoon on oiled paper.

If white sugar is used add 4 tablespoons of Karo.

#### CONCORD GRAPE JUICE.

By H. H. Plumb, assistant engineer, Denver office.

Grape juice made as follows will be a beautiful deep red and perfectly clear, the flavor exceeding anything that can be bought at the stores:

Take one teacupful of prime Concord grapes plucked from the stem and put into a quart Mason jar which has been thoroughly cleaned and scalded. Put 1 cupful of sugar on top of the grapes and fill the jar with boiling water. Put the lid on tight and set away for several weeks. The flavor is extracted slowly and improves with age. As many quarts can be made as desired or the juice made in 2 quart jars by simply using the same proportions.

#### FUDGE.

By Eleanor G. Wilson, Stenographic Section, Washington office.

2 cups white sugar.                      ¾ cup of milk.  
2 squares chocolate.                      1

Cook together, stirring only occasionally, until it will form soft ball when dropped in cold water. Remove from stove and add 1 teaspoonful butter and 1 of vanilla. Stir in well and let stand until cool. Beat well, add cup nuts, pour into buttered dish and score.

## COLORADO MINCE MEAT.

## BUTTER SCOTCH PIE.

By R. F. Walter, assistant chief engineer, Denver Office.

By Mrs. C. B. Allen, Settlement Section, Washington office.

1 pound cooked meat chopped fine.	1 teaspoonful ground cloves.
3½ pounds tart apples, cored and cut in ½-inch dices.	3 teaspoonfuls cinnamon.
1 pound seeded raisins.	½ teaspoonful black pepper.
1 pound seedless raisins.	1½ teaspoonfuls salt.
½ pound kidney suet ground fine.	½ cup molasses.
½ pound citron cut into pieces.	2 ounces candied orange peel.
2½ cups sugar.	1 cup vinegar.
	1 lemon rind and juice.
	1 orange rind and juice.
	½ pound nuts.

Cook over slow fire, stirring constantly until well mixed. If not wet enough use the broth, cooked down, that the meat cooked in. Put into quart jars. This recipe makes 11 pounds of mince meat.

1 cup medium, brown sugar.	2 egg yolks.
2 heaping tablespoonfuls butter.	1 cup milk

2 heaping tablespoonfuls  
flour.

Cream sugar, butter, and flour together. Mix eggs and milk, heat to boiling point and pour over first mixture and cook until thick.

Pour into crust which has been browned and cover with meringue made by adding 1 tablespoonful of sugar to each egg white.

Bake until meringue is slightly browned.

*Pie crust:*

8 tablespoonfuls flour.	1 tablespoonful water, or little more.
2 tablespoonfuls lard.	

## Diary of a Western Boy in Europe.

William E. Smythe, jr., a California boy of 18, son of the well-known "father of the irrigation congress," was one of a party of young Americans who shipped for an English port in the merchant marine, and spent last summer in Europe. His letters to the folks at home make delightful reading, and, as it is likely that many western boys and girls would appreciate the opportunity of sharing his experiences, the Record has arranged to present some extracts from his diary. The following installment gives a glimpse of the North Sea, Holland, and Antwerp. Later on we will accompany him to Paris.

## THE CONTINENT.

AFTER my adventures in England, I sailed from York, a busy port on the North Sea, for the Continent. It was a beautiful, cloudless day when the green steamer *York* cast off her moorings and was locked out into the River Humber. She was a small boat, and carried a cargo of old horses consigned to the butchers of Antwerp. They eat horse meat! Once out on the river a cold wind blew up from the sea and made the boat deck uncomfortable.

The two other passengers and I went to our cabins to read. I had a spacious stateroom, containing two berths and a lounge, with red plush cushions and pillows to match. I lay down on the lounge and read Tarzan of the Apes until tea time. At 4 o'clock the passengers and officers had tea in the saloon. Thus the afternoon passed, and in the evening one of the passengers, who was a vaudeville actor, entertained us by describing the various tricks of the stage.

Just before retiring I went up on deck and looked out over the water; the sea was as smooth as glass and the nearly full moon was skimming through a cloudless sky.

In the morning I awoke to find the ship at anchor and land again on both sides. Dressing as quickly as possible, I went out on deck, but meantime the

mate and the "Chips" (ship's carpenter) had been busy with the steam windlass, and by the time I reached the deck the sailors were hauling in the pilot ladder and we were again under way.

There was a large, quaint town on the port side, with many docks and warehouses. This was the Dutch city of Flushing, and Holland was on both sides of us. The bright morning sun sparkled on the blue waters of the winding Scheldt. After leaving Flushing to the stern we came to the mouth of a large canal, and a small blunt-nosed sail boat heavily laden with lumber, guided by a short stout man wearing a queer cap and smoking a clay pipe, who stood in the stern and held the tiller under one arm, crossed beneath our very bows. The square sail which was swung out on the starboard side filled to the uttermost, and the boat danced on the white foam which boiled about her prow.

Holland is a flat, green country, dotted here and there by small groups of houses and large, majestic windmills. Far off on the horizon could be seen a sail moving across the land, and one would wonder where the water was, if there was any.

We were soon called into breakfast, which consisted of tea, marmalade, toast, sausage, and mashed potatoes. Then the three passengers returned to the deck to see as much as possible.

Long, gaily colored barges slid by us, in tow of large tugs which did not seem to labor at all. Girls and women waved at us from the stern of these barges, where men tranquilly smoked, and steered by means of immense horizontal wheels. Ships of every nation plowed past us, bound for the sea, and ports in every corner of the globe.

After an hour we passed a fort on the starboard side which flew the Belgian flag; thus we knew we were in Belgium, and the captain pointed ahead, where we could easily discern the skyline of Antwerp—or Anvers, as they call it. He pointed to a high tower,



which is the third highest in the world, and is a part of the famous cathedral of Antwerp.

It took us two hours more of winding before we finally passed the great wharves and warehouses of Antwerp and tied up just beyond the American battleship which had taken our contestants to the Olympic games. I strapped my suitcase on back of my bicycle and went ashore.

The streets are paved with large stones of various shapes, and I began to wonder if they had any pleasure vehicles in Antwerp, and if so, how they got any pleasure out of them. I was just wandering aimlessly around the town, with no object in view other than to get a general idea of the place, when I stumbled on a beautiful, wide, smooth, tree-lined boulevard, and thus got to the center of the city. As it was nearly 1 o'clock, I began to feel the pangs of hunger, and as I again neared the wharves and the poorer part of town I heard the sound of cheap music and smelled doughnuts frying. I followed my nose and came to a small street fair, such as one often comes across in European cities. I went immediately to the stand where doughnuts were sold (or something like them), and asked the lady who dispensed them, "Combien?" She replied, "Une franc la douzaine." I then took the smallest bill I had, which was 20 francs, French money, and gave it in payment for the doughnuts. The woman shook her head, and asked me something. I didn't understand, whereupon I answered here, "S'est le plus petit." "Oui, oui," she answered, and went off with it. After some time she came back with the change in Belgian money, which I afterwards learned was not of much account in France, and I went off consuming the doughnuts as fast as possible.

Next I visited the Antwerp cathedral, which is beautiful, although very old, and still has the marks of shells in some places.

It then being nearly 1.30 o'clock, I decided to look up the Olympic games. After asking numerous policemen, who carried a sword on one side and a pistol on the other, I managed to find my way to them. I "parked" my bike where a man agreed to watch it for a franc an hour, and then went inside. The stadium was much like the numerous ones in American cities—a large oval inclosure, with the boxes and most expensive seats on one side, the "bleachers" and standing room on the other side. In the center of the high-priced section was a large box draped with purple and red velvet, bearing the royal coat of arms of Belgium. This was King Albert's box, but he did not appear that afternoon. It was an unusually dull afternoon, and there was neither a large crowd nor many events. However, I noticed a number of American soldiers in the audience.

The only events in the two hours I spent there were performed on parallel bars and rings. I was, however, very glad to see even that much of the great

Olympic games, especially as the winners were Americans.

It was nearly 6 o'clock when I again reached the downtown section, so I looked up a café near the Gare Midi, where I was served with a good thick steak, coffee made in a little percolator over the cup, and apple pie. The place was full of Americans.

After dinner I went to the station, checked my bicycle through to Paris and bought a second-class ticket for the French capital via Brussels. At 8.10 I boarded an express train for Brussels, and as we moved out of the station a group of four American sailors "rolled" down the platform, singing the inspiring song "Over There," with a decidedly Yankee twang. I settled contentedly back against the blue cushions, and was surprised to hear some one say in perfect English, "And you, monsieur, you are American?"

(To be continued.)

## ORLAND HIGH SCHOOL.

Through one of those inexplicable lapses to which even the best regulated publication is occasionally subject, we published in the September issue of the RECLAMATION RECORD a photograph purporting to be the Orland high school, and were promptly called to time by the alert project manager of that progressive project.

Mr. Burch writes that the building represented has not been used as a high school since 1914 and is now used as an annex to the Orland grammar school, which occupies 15 rooms and employs 16 teachers.



The Orland High School group.

The accompanying illustration shows the high-school group as it stands to-day, comprising the main building and a gymnasium building built three years ago. The Orland high school at present houses something over 200 pupils and employs 12 teachers.

System isn't red tape. Good business men know it. Housekeeping and homemaking is a business. System is an essential in its successful operation.

## H. T. CORY ADDRESSES WASHINGTON OFFICE.

### Describes Plans for Utilizing Waters of the Nile.

[Mr. H. T. Cory resigned his position as consulting engineer for the Reclamation Service in January last, and went to Cairo to serve as a member of the Nile Projects Commission, charged with the duty of passing upon the larger irrigation problems of that historic stream and with the allocation of its waters between the Sudan and Egypt.

The commission traversed the entire length of Egypt and a large part of the Sudan, reaching almost the heart of equatorial Africa. Its final session was held in London and ended August 25. Mr. Cory reached New York on September 20 and Washington a few days later, after one of the most interesting experiences that ever fell to the lot of an American engineer.

Members of the Reclamation Service are naturally interested in the problems of the Nile—a stream which is in many respects like our own Colorado River. Taking advantage of his presence in Washington before his departure for his home in California, they invited Mr. Cory to tell the story of his experience on the Nile at a meeting held in the Director's office. Assistant Director Morris Bien presided in the absence of Director Davis, and welcomed Mr. Cory as "one of our own who has borne the standard of our high ideals to a foreign country."]

Mr. Cory said, in part:

I FEEL quite deeply the friendship and pleasant relations that I have had with the Reclamation Service in the past two years, so that I appreciate very much your greeting.

I left here January 21 and hurried to Cairo as quickly as I could. On my arrival there I met the other two members of the commission and learned for the first time what was the real purpose of the commission and why it had been called into existence.

The president of the commission was Mr. F. St. J. Gebbie. He then was second in rank of the Indian Irrigation Service, which has done an enormous amount of irrigation work. He is taking a leave of absence now which will extend until December, and when he returns to India it will be as head of the entire irrigation service in India. The position, in a general way, is similar to that of Dr. Davis as Director of the Reclamation Service in the United States.

The third member of the commission was a meteorologist, who had been selected by Cambridge University. The Egyptian Government wanted the commission to consist of two engineers and a meteorological physicist. The man selected was Dr. G. C. Simpson, at that time meteorologist or head of the Weather Bureau of India, but, effective September 1, he has been transferred and is head of the weather service of Great Britain, which has been thrown under the military air service. He had charge of the meteorological observations with Scott on his journey to the South Pole, is a D. Sc., a member of the Royal Scientist Society, and one of the world's authorities on weather conditions.

An American engineer was selected for two reasons: First, because of the large amount of irrigation ex-

perience which America has; and, secondly, because of the position of America as a Government with the Egyptian people. They feel that America is capable, the land of square dealing, and they have a very flattering respect and confidence in an American doing things right and doing them fairly.

Sir William Willcox, a very fine old gentleman, and a man whose position in the hearts of the fellaheen, who are the peasant and farming people of Egypt, is unquestioned, went to Egypt many, many years ago, and the work that he has done for improving the lot of the fellaheen has been notable. He is one of the world's greatest irrigation engineers. He visited this country some years ago, inspected many of our irrigation projects, and became acquainted with a number of our Interior Department officials and employees. To such an extent was he known and admired here that the day I left Washington the Officers' Dining Club by rising vote sent by me heartiest greetings to him. Of course I called on Sir William Willcox the first thing on arrival in Cairo.

Some 20 years ago Sir William suggested the construction of the so-called Aswan Dam. Egypt has no oil, no coal, practically no wood, and no water power, and so is an arid agricultural country consisting of at most, the very utmost, 7,000,000 acres which can ever be irrigated. To-day there are about 5,000,000 acres under irrigation. That irrigated land consists of a narrow strip about 500 miles long, with a maximum width of about 8 miles until you come to Cairo, and then begins the delta fan. Until recently it produced its own food supply, had very primitive methods of doing everything, and had nothing to export. Mohammed Ali, former Khedive of Egypt, was a wise, far-seeing man, and he conceived the idea that if Egypt could grow cotton it would have a money export crop, so he called in some French engineers.

Now all this time, from the Pharaohs down, the only irrigation of the Nile came through water taken out by canals which diverted water only in flood. There were no diversion weirs on the Nile. The French engineers suggested a diversion weir somewhat north of Cairo, which was then built by them. However, when finished the head against it started it sliding downstream and no attempt was made to use it.

The English, French, and other nations were compelled to go into Egypt in 1880 because Egypt had gotten into debt to the extent of nearly £100,000,000 and was bankrupt. It belonged to Turkey at that time, so France, England, Germany, and other countries where Egyptian bonds were held stepped in. In a very short time the English became the dominant element in the situation and in due time English engineers were called upon to see what they could do to brace up the Delta Barrage. They put an over-



pour weir about a quarter of a mile downstream to back up water against the downstream face and by this means made it safe to use the Delta Barrage.

As soon as this was done the canals could divert during the low-water stages, and cotton—which is planted just as the low water begins—could be grown. The cultivation was found very profitable and the cry came for more, so they built another barrage, taking water up in this narrow strip or Upper Egypt. That water was soon absorbed. Demand was made for another barrage, which was built, and that water was soon absorbed.



The pyramids of Giza.

Then came the question of storing water during flood to supplement the low flow of the river. Sir William Willcox suggested that this be done at Aswan, and he largely outlined the whole project. He wanted to build the dam rather high and create large storage, but there were "nature lovers" in that country and they objected to the dam being built so high that it would flood the island of Philae, on which were built some fine old temples in very ancient times—about 1,800 years before Christ. So they built the dam much lower than the best engineering practice would call for, finishing it in 1903. In 1908 that stored water had all been used and cotton growing had become an enormous factor. Its returns were great and so proponents of more storage water were able to overcome the objections of the "antique lovers" to flooding the island a part of the year by assuring them there would be no damage to the temples. So the dam was raised in 1912, but it was not raised as high as Sir William Willcox thought it ought to be.

Sir William criticized both these structures in 1903 and in 1912 because they were not storing as much water as he thought ought to be stored, and suggested that they go downstream about a quarter of a mile and build a new dam much higher than the dam just raised.

The Government soon found that all the stored water was quickly taken up and that there was an in-

sistent demand for more. Soon the authorities were able to allow the people to put in only one-half the cotton that they desired because they had not enough stored water to do more. It was then suggested by English engineers, "We will go up above the boundaries of Egypt into the Sudan and there we will put in more storage." Two dams were proposed, one at Makwar on the Blue Nile, 200 miles south of Khartum, and another at Gebel Aulia, on the White Nile, 40 miles south of Khartum. The Blue and the White Nile join at Khartum.

Sir William Willcox objected to that. He said the thing to do is to keep storage works inside of the Egyptian frontier. The Egyptian engineers and the Egyptian people looked very much askance at having any works which would have to do with the conservation of the Nile outside of Egyptian territory. They urged that if works were built above the Egyptian boundary those in control of the region could reverse the normal use of dams, open the gates in the time of flood and shut them in time of low water and take away even the normal low water which Egypt receives. This would give a control over Egypt that would be even more powerful than an army and the Egyptians feared to have a sword of Damocles thus held always over their heads. That fear is an honest fear on the part of the Egyptian nationalists, and it is due to the fact that they have been deeply impressed with the belief that power is might, so when they feel that something is more powerful than they, and that that something has control over so vital a thing to them as the Nile, it is an unbearable situation. "We must limit the growing of cotton to the area that is now being grown, or we must get more storage. The only way to get more storage is to go outside for it. Choose between the two evils, and we say 'Better bear the ills we have than fly to others that we know not of,' " said the nationalist. "Let us have more stored water," said many large landowners.

In the midst of this division of sentiment between the Egyptians, and Sir William Willcox objecting to the plan, Col. M. R. Kennedy, director of the public works of the Sudan, said: "You propose to put the dam across the White Nile and store water only for Egypt, but you also plan a dam on the Blue Nile to irrigate a great area just above Khartum in Sudan, and if you do that you will take water that Egypt should have."

There is one other phase of the psychology to be mentioned before we are ready to understand the situation. In Egypt and in India they have no individual water rights. Water is conserved by the Government, is turned over to the people by the Government, and it may say to me, "Cory, you can irrigate your land this year and next year you can not," and I have nothing to say. Taxes in Egypt are exclusively on the single-tax basis; the only taxes in Egypt are the taxes which the Government takes for the water

supplied to the land, and if my land receives no water this year I pay no taxes, but if my land does receive water I pay taxes. It really is the case that the sole revenue of the Egyptian Government, outside of the State railroads and a flat low ad valorem customs charge, is this water rental. The idea of having any individual rights of one man as against another, or of one district as against another, has not entered their heads. The Government is all powerful and allocates the water each and every year without any reference to the year before or the years to come.

To such a condition of affairs add the suggestion that the Government in the Sudan is going to take water out of the Nile to irrigate lands in the Sudan, and the further statement of an English engineer that "If you do that you will take water that Egypt needs," and you can understand how very excited and nervous the Egyptian people became about the construction of these works.

The fight got rather severe and Sir William Willcox's long record in the country as the friend of Egypt gave to his criticisms great weight. The Government was compelled to appoint a commission of three officials to pass on the Government's projects, and this commission soon reported, favoring the projects absolutely. Sir William Willcox, Col. Kennedy, Egyptian engineers, and many Egyptian nationalists brushed the verdict of the commission aside with the statement that "that does not interest us at all. It has no significance for us." Then another commission was appointed, consisting of the three retired heads of the irrigation department, Prof. Unwin, of London, a very famous engineer, and the fifth, a London engineer whose name has slipped my mind for the moment. The commission reported two years ago, after going into the matter exhaustively and listening to Col. Kennedy and Sir William Willcox's criticisms, approving the projects and finding many of the criticisms of Col. Kennedy and Sir William Willcox were not well founded. This was expected to settle the matter. Instead of that, the fight became even more bitter.

I was very much perturbed because I thought a great deal of Sir William and as soon as I met him came to like him very much, while as soon as I met Sir Murdock McDonald, English adviser to the Ministry of Public Works, I liked him also. We quickly started up the river and looked over the projects, came back and had public hearings. We had a judge and we held sessions for four weeks. We decided that the projects were the only possible ones from a strictly engineering point of view, but made no recommendations as to their being carried out. The commission then recessed from July 1 to August 1 and met in London to finish its final report on the project as a whole and on the allocation of water.

As a matter of fact, there is not as much water for irrigation in Sudan as the Government thought, and it is due to the fact largely that they had not taken into account Egypt's rights. None of the engineers or the people with whom I talked over there had the faintest appreciation of water rights as we understand them, owing to the fact that the Government is the absolute, arbitrary judge on the allocation of water under the ordinary course of maintenance and operation.



Native boats on the Nile.

I suggested immediately that Egypt was entitled to the water which it had used up to date during the respective months when it had so used that water, and the Sudan likewise (which uses a relatively small amount of water) and that the residue of the water in the Nile was all that remained to be conserved and divided between the two countries. Now, on that basis it means that Sudan, in the plans involved, will have a total crop failure in the very dry years, something which the Government had said would not occur, and something which Col. Kennedy had said would occur. Hence, in that respect, Sir William Willcox's and Col. Kennedy's criticism of the proposition was in considerable degree well founded. Unfortunately, in order to get a hearing before the powers that be, they went beyond what was fair and reasonable and left the matter in a badly mixed way.

The work of our commission was to straighten out the tangle. At times it was extremely pleasant, always interesting—intensely interesting, and in one or two respects most painful.

The Nile is about 3,000 miles long from Lake Albert to the coast. It is about 150 miles shorter than the Mississippi River. It has a discharge of 450,000 second-feet or, roughly, two and one-half times the Colorado River and about one-fourth as much as the Mississippi River. Its flood discharge is about twice the mean flow of the Niagara River at Niagara Falls; 60 per cent of it comes from the Blue Nile system, which is a system with but one important storage possibility. Much of the river has a rather



steep bed, flows through as yet unexplored canyons, and is very silty in times of flood, maximum flood occurring during August, September, and October.

Forty per cent of the main Nile comes from the White Nile. This issues from Lakes Victoria and Albert, passes through a great swamp area about 300 miles long, called the Sudd region, in which it loses half the water. Its enormous reservoirs keep the stream very uniform. Its maximum flow is only about three times its minimum flow. It never has any silt.

It was suggested by the British officials that they allocate the White Nile to Egypt and the Blue Nile to Sudan. I suggested that that would not be feasible because on the Blue Nile system there is but one storage opportunity, and that is in Abyssinia, by which only 8 per cent of the Blue Nile will go; on the other hand, the storage opportunities are practically unlimited in Lakes Albert and Victoria, which storage would consist almost exclusively of over-year storage, so the division of the waters of the Nile into those two branches, having such fundamentally different hydraulic characteristics, was quite impracticable.

The development of the Nile project will be in three stages. The first stage, which was started, and stopped when these criticisms began, consists of a dam on the Blue Nile at Makwar about 200 miles above Khartum and furnishes a relatively small amount of storage, but will divert water for 3,000,000 acres on the most level land I ever saw in my life.

The other, Gebel Aulia Reservoir, is nothing more nor less than flooding the channel of a very flat river by a dam. That reservoir will cover about 175,000 acres of land, as I recall it, will be some 350 miles long, will lose in evaporation about 3,225,000 acre-feet each year and provide 3,500,000 acre-feet of stored water for use in low stages. The Lake Tsana storage on the Blue Nile will consist of about 9,000,000 acre-feet. The storage on the White Nile will consist of about 75,000,000 acre-feet. Those are big figures.

The avoidance of Sudd waste would require the construction of a canal about 225 miles long, 1,000 feet wide, and 40 feet deep, and mean about twice the yardage of the Panama Canal. The first stage of development will supply water for the irrigation of about 600,000 acres; the second stage will add about 1,000,000 more; the third stage will add about 4,000,000. Ultimately, if all of these projects are carried through, the Nile will have of its mean average annual flow about 80 per cent used for irrigation and will water effectively 10,000,000 acres of land. To-day there are 5,000,000 acres irrigated, but a good deal of that is not satisfactorily watered.

The Nile project is the biggest irrigation project in the world. It is the most expensive and the figures, as to cost—about \$250,000,000—would make you think that the matter is thoroughly absurd. However, agricultural land in Egypt is now selling for £100 an acre. The result is that these enormous cost figures

will stand, even if those land values were cut in half.

The real justification for all this work is long-staple cotton, which can be grown only under desert conditions. Hence, excepting for a small area in our Salt River project and in the Imperial Valley, and a possible acreage in India, Egypt has a monopoly on that particular thing, and that particular thing is wanted by the world very much.

I think those are about the essential facts of the Nile project. The allocation of the water of the Nile between Egypt and Sudan was a question of much interest. The Egyptians assume that the Nile all belongs to Egypt until Egypt shall have supplied all her needs, and those needs, as I told you, are for just 7,000,000 acres in Egypt.

I felt that any decision of the commission about the allocation of water might be taken as a precedent for similar things and that it was pretty serious business and one that should be gotten right, and so a good deal of discussion was held as to the last reasoning, which would be adopted in the allocation of water between the two countries. I could not agree to the methods proposed of turning over the Blue Nile to the Sudan and the White to Egypt, and I could not agree that we did not know enough about the needs of the countries to give any recommendation at all beyond the first stage; and because I felt that we knew quite as much about the needs of the countries as about the water supply of the Nile, the result of it all was a recommendation on my part that the excess water of the Nile, over and above the existing rights based along the lines I have indicated, should be divided between the Sudan and Egypt equally. My colleagues approved the original suggestion of the Department of Public Works on the division of water, saying that the ideas and reasoning that I suggested were all correct enough but that essentially the same thing would be produced by turning over the Gebel Aulia Dam to Egypt and the Makwar Dam to the Sudan. Except in that particular, our reports were unanimous. The records have been handed in to the Egyptian Government and will no doubt be accepted and published. The interim report was the first important thing, because there were 7,000 people working on one dam and about 4,000 people working on the other, and those people were practically marking time during our investigation.

European corn borer has been discovered in Canada, the United States Department of Agriculture finds, and warns against this new source of infection.

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**MISSION VALLEY FAIR, FLATHEAD PROJECT, MONTANA.**

By N. B. Hunt, Office Engineer, Flathead Project.

**T**HE third annual Mission Valley Fair was held at Ronan, Mont., September 16, 17, and 18, 1920, and was the most successful event of its kind in the history of the valley. The industries of the project were well represented and a generous measure of amusement was provided in addition to attractions of a more serious nature. Cash prizes were awarded for all forms of competition.

Agricultural and live-stock exhibits were of first importance, and there were also departments of home economics, child welfare, Indian fancy work, and boys' and girls' club work. The athletic program included foot racing, horse racing, horse riding, steer riding and bulldogging, and several novel frontier features.

The agricultural display probably received the most attention and from the standpoint of irrigation was the most interesting and instructive. The exhibits were arranged attractively and their diversity and quality was impressive. They would be worthy of mention among exhibits from any locality and were doubtless a revelation to strangers under the impression that Montana is adjacent to the North Pole and suffers a corresponding lack of agricultural potentiality.

Competition for prizes in this division was individual and collective. The districts that competed were Polson, Post Creek, Moiese, Valley View, St. Ignatius, Ronan, Pablo, Charlo, Mountain View, and Horte. In awarding prizes consideration was given to the number of exhibits, their arrangement, and their quality. First prize went to Moiese and second prize to Charlo.

Samples of Mission Valley alfalfa and pasture grass are shown in one of the accompanying photographs. The alfalfa was planted May 15, had three irrigations, and the first clipping took place August 10. It was expected that the first hay crop would be harvested September 20. The specimen is 42 inches long, of which 30 inches was above ground. Several varieties of pasture grass are shown, including Kentucky blue grass, rye grass, timothy, and clover. This grass also had three irrigations. One acre of this forage will support three dairy cows.

The visitor to the fair became impressed with the fact that irrigation is necessary in the Mission Valley. Many farmers were emphatic in stating that water is essential to its proper development and a necessary insurance against crop failures. This is encouraging as compared with the attitude in the past and although it can not be given as a unanimous expression of opinion, the tendency is, nevertheless, to regard irrigation more favorably.

**FLATHEAD EMPLOYEES ENJOY OUTING.**

The first annual picnic of the Reclamation Service employees of the Flathead (Indian) project was held on August 15, 1920, and we are indebted to Project Manager Moritz for the illustrations of this historic event reproduced on the inside cover page.

Mr. Moritz writes that "The picnic was held in the beautiful Mission Canyon, about 5 miles east of St. Ignatius, and was attended by about 30 'kids' and 40 grown-ups. There was the usual abundance of refreshments, and 'a good time was had by all.'"



Some of the exhibits at the Mission Valley Fair.



## TIETON EXHIBIT AT WASHINGTON STATE FAIR.

By Floyd Foster, Secretary Tieton Water Users' Association.

**T**HAT the Tieton unit of the Yakima project, Washington, grows prize-winning products has again been demonstrated by the showing made at the State Fair held in Yakima September 20 to 25, 1920.

In 1919 the products from the Tieton project were assembled in the Yakima County exhibit and did not receive consideration as a separate exhibit; but at the previous fair (1918) the Tieton had a separate exhibit, which was awarded first premium.

For the 1920 fair no preparations were made by the water users' association under the impression that the farmers granges on the project would assemble an exhibit. On Thursday, three days prior to the opening of the fair it was learned that no preparations had been made for an exhibit and the secretary of the association immediately got busy. Arrangements were made with the fair management for the largest space that could be obtained, and on that late date we could get only 10 by 15 feet. J. S. Moore, superintendent of irrigation, telephoned to all of his patrolmen to learn where suitable samples of crops could be obtained and through their assistance began to collect articles for an exhibit on Friday morning, and by Saturday night more stuff had been assembled than the limited space secured would accommodate. In the meantime the secretary of the association had decorated the booth in green and gold cheesecloth and put in tables and shelves to display the products to the best advantage. Sunday morning he was ready to begin putting the exhibit in place, and for this work secured the assistance of Mr. R. H. Hayden, the former association secretary, who had some experience in this kind of work. The back wall of the booth was covered with ear corn of three varieties, in yellow, white, variegated, and red, together with sheaf wheat, oats, and rye, with sprigs of silver and tragedy prunes. A shelf immediately above the back table was then filled with trays of apples, pears, and peaches set obliquely so they would be visible from all parts of the building. In the center of the shelf was placed a case of fine honey with a glass front showing the perfect capping of the comb. Immediately under the shelf on the back of a sloping table was placed a row of Improved, Ordinary, and Golden Hubbard squash, one end terminating in a golden-hued pumpkin and the other in a 60-pound yellow Chile squash. The balance of this table was covered with a display of vegetables and root crops, consisting of potatoes, beets, carrots, tomatoes, sugar beets, artichokes, onions, pop corn, sweet corn, cantaloupes, beans, and other garden products, all arranged to make a harmonious color effect.

In front of the back table were placed two 10-foot tables endwise, leaving an aisle between. These

tables were covered with plate exhibits of apples, peaches, pears, prunes, and plums, with a nice bouquet of asters by way of decoration. On account of the lack of space otherwise a 12-inch shelf was placed lengthwise of each table about a foot from the floor and along the front railing of the booth. These shelves were covered with the overflow of plate exhibits of both fruit and vegetables and tray exhibits of thrashed wheat and rye.

There were included in the exhibit 22 varieties of apples, 3 of peaches, 4 of pears, 4 of tomatoes, 4 of carrots, 3 of potatoes, and from 1 to 3 varieties of nearly all the other products. The largest Hubbard squash was grown by Mrs. R. C. Davidson, and weighed 51 pounds. The wheat and rye were grown by W. E. Thompson, B. F. Petty, Thorne Hiltz, and Mrs. Margaret Splawn, and showed yields of 68 to 72 bushels per acre. George Weikel furnished Chile squash weighing about 60 pounds each and stalks of corn over 12 feet high. Peaches grown by J. M. Shannon, J. M. Everett, W. E. Eakin, and E. B. Taylor were exceptionally fine, although good peaches were shown from several other growers. As peaches in many sections were a failure this year, the Tieton peaches received much attention, and many visitors made special inquiry as to where they were grown.

Our exhibit was awarded first premium both on the exhibit as a whole and on the arrangement and decoration, and we feel that if we can make such a good showing on three days' notice, with a little more time we could assemble an exhibit that would be a credit to an entire county.

More than 100,000 people visited our fair this year, and the possibilities of the results of irrigation were demonstrated to many who had never before visited this wonderful valley.

The Tieton project comprises 32,000 acres lying immediately west and northwest of Yakima; and the irrigation system cost nearly \$3,500,000. We are only 10 years out of the sage brush, but with a crop production last year worth more than \$4,000,000 from less than 30,000 acres in cultivation, we feel that the Tieton project can not be excelled.

We desire to express special appreciation of the co-operation of the water users in donating exhibits, and for the assistance of Mr. Moore and the canal patrolmen in collecting them.

The premiums received have been set aside as a fund to provide for exhibits at future fairs, and the trustees of the association have gone on record as favoring a larger effort next year, when we hope to show the world what the Tieton can do.

**Work and Save. Buy Government Securities.**

## ENGINEERING INVESTIGATIONS.

## Report on Inspection of Metal Flumes, Uncompahgre Project, Colorado.

By F. D. Pyle.<sup>1</sup>

THE following report covers an inspection made of the metal flumes on the Uncompahgre project of the United States Reclamation Service, April 27 to 30, 1920. Sixty-nine flumes, having a total length of 15,735 feet, were inspected. The number, size, and length are given in the accompanying table.

Number of flumes.	Size (circumference).	Total length.	Number of flumes.	Size (circumference).	Total length.
	<i>Inches.</i>	<i>Feet.</i>		<i>Inches.</i>	<i>Feet.</i>
8	60	2,781	2	144	175
6	72	1,089	2	156	669
20	84	3,862	3	168	1,058
6	96	382	2	180	400
2	108	246	3	192	563
5	120	1,513	2	204	564
5	132	1,605	3	228	828

The earliest flumes were installed in the fall of 1911, the latest in the spring of 1920. Thus a large range of lengths of service, types of flumes, and varieties of metal was encountered.

## CONCLUSIONS.

In the construction of flumes, careful attention should be paid to foundation and superstructure in order to maintain alignment and to keep superstructure from contact with earth.

Approaches should be warped in order to secure easy transition from canal section to flume section and back again.

The headwall of the approach of large flumes should be constructed to fit shape of flume when loaded.

Ample capacity and freeboard should be provided. All fittings should be galvanized.

High velocities should be avoided if much heavy silt is carried.

In order to secure long life exceeding, say, 10 years under conditions as prevailing on the Uncompahgre project, the following requirements should be met:

(a) Proper design as to sufficiency of foundation, sizes of bands, washers and cross ties, and a thickness of metal which will obviate excessive deformation.

(b) Thorough galvanizing.

(c) Joints which do not project into the current and which avoid cavitation.

(d) Trapping out of sand and gravel.

(e) Coating with a good quality of coal tar of joints and of inside of sheets as frequently as wear makes necessary, possibly joints every year and inside surface every two, three, or four years.

(f) Provision for temperature changes either in the individual joints themselves or by expansion joints.

(g) Provision for self-drainage.

## GENERAL CONDITIONS.

It was difficult to make close inspection of the interior of many of the flumes on account of water being carried for irrigation, and on account of the tar coating on the interior of many of the flumes. It is very probable that many of the flumes examined, that appeared to be in good condition, would show rust holes at the joints if taken apart.

Water for irrigation is carried through all flumes for at least eight months of each year. During the remainder of the year they are alternately wet and dry, according to the weather conditions. Some of the flumes do not drain out well, with the result that there is some water in the bottom of them the entire year.

The question of drainage of the flumes does not necessarily depend upon the grade of the flume but upon the relative elevations of the bottom of the flume and the canal below. In many places the canal has filled up so that from 2 to 6 inches of water remained in the flume after the canal had quit running.

## FOUNDATIONS.

Four general types of foundations were found as follows: Concrete, stone, piling, and timber bents, all of which were in a satisfactory condition except that several piling under Flume G 4.02 had rotted off owing to poor material used and alkaline soil. These had been sawed off and replaced. Concrete and stone have been used only where the foundation conditions were good. There had been little settlement where this type of foundation was used. Piling was used only under Flumes G 3.517 and G 4.02 where they cross the large arroyos east of Olathe and on Flumes B 0.00 and B 1.77 of the West Canal.

Where flumes were placed on the adobe soil underlain with shale, timber bents were used on account of the unsatisfactory foundation. In almost every instance the bents settled from 2 to 12 inches, making it necessary to block up the superstructure. All piling and timber bents were dipped in creosote oil before driving or framing.

<sup>1</sup> Formerly project manager, Uncompahgre project, Colo., now secretary and manager of the Columbia Irrigation District, Kennewick, Wash.



## SUBSTRUCTURES.

All substructures were of wood. Some were untreated, some treated by dipping in creosote oil, and some painted. The substructures that were painted appear to be in the best condition. The untreated lumber was weathered and checked considerably, and the treated lumber showed some deterioration, but not as much as the untreated. In a few instances dry rot was apparent in isolated pieces of timber.

In a considerable number of instances where dirt and alkali soil, especially sand or sandy loam, had been allowed to come in contact with the bottom of the substructure posts and braces, rot has made it necessary to cut off and block under the posts and to replace braces in 5 to 10 years.

In very few instances were substructures over 30 feet high. Where crossing dry water courses subject to floods with comparatively low head room, flat overhead A braces were used prior to 1914. These have invariably sagged and have been braced up in numerous ways. Where the foundation has settled, the timbers in the substructures have been twisted and cracked, occasionally to such an extent that a few timbers have been replaced.

A considerable number of crossties were cracked, and gave the general appearance of being too small for the load carried. On a number of the flumes the washers were pulled into the crossties, where the flumes had been tightened; if not when the flumes were installed, possibly when they were tightened to prevent leaks several years afterwards. This indicates that the crossties and washers were both too small and on account of the number of flumes affected it is believed that our designs have not provided adequate sizes to give the best results.

## APPROACHES.

Three classes of material have been used in the construction of approaches—wood, treated and untreated, and masonry. The concrete and stone masonry transitions properly warped from the canal section to the flume section make the most suitable approaches. Wood was used only where considerable settlement was expected, and in alkali soils.

On the West Canal system a number of temporary wooden approaches in sandy soil, built of untreated timber in the winter of 1912 and 1913, were badly rotted by the fall of 1919, and concrete approaches were placed inside the wooden approaches which had been designed so that this could be done. In many cases 3-inch planks had been rotted through. Treated timber is lasting somewhat longer in the sandy soil and is giving excellent service in the adobe soils. The remainder of the wooden approaches on the West Canal will be lined with concrete during the coming winter.

## METAL.

The first flumes placed on the project were of Apollo Best Bloom steel. Later steel and tight-coated steel were installed, and still later Keystone and Armco. All metal was galvanized except for 250 feet of black metal in a test flume.

The gage of the first flumes constructed was very light, 22 gage being used for practically all flumes, including No. 120. Later flumes were built of somewhat heavier metal, 20 gage being used for flumes as small as No. 72.

Some trouble has been encountered in a number of flumes in securing a good contact between the metal and the approaches, and in the case of the larger flumes, such as G 543, having flume size 204, cracks



Happy Canyon flume, Uncompahgre project, Colorado.

opened at the joints when it was carrying a large head of water. These cracks were due to the change in the shape of the flume from a circle at the approach to a catenary where the metal was not supported by the approach. To remedy this condition, 16-foot timbers were solidly supported under the flume, and wedges driven to equalize the weight.

In building flumes of large size it is probable that the approaches should be designed to correspond closely to the shape of the flume when loaded.

The size required for the first flumes placed was determined by Kutter's formula, using a low value of  $n$ . Later it was found that the value of  $n$  should have been taken somewhat higher, especially with the Maginnis rough interior flumes where the inside joint rods project into the flume from one-fourth to three-eighths of an inch.<sup>2</sup>

Practically all of the flumes on the CQ Lateral were enlarged in order to carry the amount of water the lateral was designed for. In replacing these flumes the stringers on the substructures were raised 12 inches by placing planks on top of the original stringers and bracing at the post. The width at the top of the stringers was not increased, and new metal sheets were obtained 24 inches longer than the original metal. These were rolled so that the top 12 inches on each side was vertical, and the remainder of the sheet was the same shape as the original sheet. The carrier rods and inside bands were shaped to fit. As the flumes decreased in size toward the lower end of the lateral it was possible to replace a number of the lower flumes with metal taken from the upper flumes. When this was done the width between stringers was not varied, but the metal was drawn to a narrower diameter than originally constructed in order to fit, making the sections more or less egg shape. All of the flumes constructed during the past five years have ample capacity.

#### PAINT.

Of the 69 flumes, 59 have received a coat of tar or paint on the interior in order to protect against rust and erosion. The first tar was used in 1913, but proved to be too brittle and lifeless. In the spring of 1916 various kinds of paint were tried without success. Later several paint companies furnished small lots of paint to make tests. In no case have these paints proven equal to coal tar as placed during the past three years.<sup>3</sup>

In the fall of 1917 and spring of 1918 a number of flumes were treated by applying a coat of water gas tar followed by a coat of coal tar thinned with water gas tar. This made considerable extra work, and in a number of cases the coating was too thin, either

running to the bottom of the flume or checking and cracking on the side of the flume exposed to the sun. Since the summer of 1918 coal tar has been used without thinning, with very good results. The best results have been obtained when tar was applied before the flume had been used more than one season and when tar was applied in warm weather. When applied in cold weather it would not stick to the metal, but blistered and peeled. In tarring flumes it was found essential to clean the surfaces thoroughly, removing all rust from the sheets and from the joints, and to have them perfectly dry and free from dust. The tar was applied hot with heavy brushes or burlap swabs.

Conditions indicate that the joints should be re-tarred every fall, and the entire flume every other fall. On account of the long irrigation season, it has been difficult to tar as large a proportion of flumes each year as would be most advisable. The tar coat fails by drying, checking, peeling, and blistering. In some cases there is a tendency to erode from the bottom, especially where gravel is carried by the water. A heavy coating of coal tar has proven to be the best method of protecting the flumes when properly applied. In tarring Flume C 5.43 (502 linear feet of No. 204 flume) 550 gallons of tar were used, or 0.58 gallon per square yard. The labor and material cost was 21 cents per square yard. An extra heavy coat was given this flume.

#### FAILURE OF METAL.

Flume metal fails principally at or near the joints, although occasionally pitting occurs along the lower arc of the flume. Of 930 feet of Maginnis flume used eight seasons, 33 per cent pitted through at the joints, and 9 per cent on the surface of the sheets. Pitting generally took place on the downstream side of the joint, with the exception of a few flumes of the West Canal, where the joint was arranged so that there was a flange giving a double thickness of metal below the joint. In this case the pitting was on the upper side of the joint. Where the workmen had inadvertently changed the sheets so that the flange was upstream, the pitting took place on the downstream side of the joint. Apparently all pitting and rusting takes place from the inside or water side of the sheets and works toward the outside. Where the pitting was in the joints it started at the bottom and progressed outward and upward through an arc of 12 to 18 inches. Where pitting was along the sheet, it generally occurred at the bottom, although isolated pitting was observed for 15 to 24 inches from the bottom.

It is probable that a large number of factors affect the life of the metal, principal among which may be mentioned the use of black iron fittings, the velocity of the water especially where carrying sand or gravel, alignment, alkali water, and type of joint.

There appears to be a greater tendency for the metal to pit near the black iron fittings of many

<sup>2</sup> See RECLAMATION RECORD, Jan., 1917, p. 37, for experimental data on value of Kutter's  $n$  for metal flumes.—*Ed.*

<sup>3</sup> See RECLAMATION RECORD, Nov., 1916, p. 519.—*Ed.*



flumes than where galvanized strips are used as the inside member of the joint as in the corrugated type.

It is probable that the velocity of water, especially where carrying heavy silt, seriously affects the life of the metal. In one extreme case, that of Flume CQ .076, located below the big drop on the Montrose and Delta Canal, where 200 second-feet of water is turned over a sandstone bluff which gradually erodes, the original flume lasted only four seasons; the bottom was badly pitted along the entire length of the flume when it was removed. However, in another instance, Flume FND 3.42, a large amount of gravel and sand has been carried through a flume installed in 1914 without serious results, there being no pitting or rusting visible on the outside of the flume.

It is very probable that where alignment is poor, owing to settlement of foundations, additional strain is thrown on the metal, breaking the spelter and hastening rust and pitting.

Alkali water is apparently detrimental to the metal, but no direct cases can be cited.

The life of the metal may be affected by the type of joint; some joints have sharp bends which cause additional strain on the metal and a tendency to separate the spelter or galvanizing from the metal. In some types of joints, such as the original Maginnis joint, where the inside iron projects into the water section, the tendency is to erode the metal below the joint. In other types of flume, the metal is arranged so as to be double or even triple at the joint, giving increased strength and requiring longer for pitting to make the flume leak.

The metal on only a few flumes has been replaced on account of failure of sheets by rusting and pitting. However, in removing the metal on the CQ system in order to increase the capacity, it was found that only about 60 per cent of the sheets could be used for replacement purposes. Various uses have been found for the removed sheets. First, the good sheets have been sorted out and replaced as flume where possible. Second, they have been used for covering barns, tool boxes, etc., and for covering roofs. Third, sheets have been trimmed and rerolled. Fourth, sheets have been cut in two, and used in construction of small-sized flumes, that is, No. 144 sheets have been cut into No. 72 sheets. In this way the rusted and pitted portion of the metal has been brought to the top of the flume, leaving good metal at the bottom.

In several places flume metal has been used for canal lining as a temporary expedient. This has not proven successful, as the rusting and pitting then takes place on both sides, thus shortening the life of the metal. Great difficulty has been encountered in maintaining this kind of flume on account of water getting behind and under and causing it to float. This type of construction will soon be all replaced by ordinary timber bench flumes.

#### JOINTS.

The following types of joints were observed: Maginnis rough interior, Maginnis smooth interior, Hess joint with flange, Hess joint, Hess joint with galvanized fittings, Himman, corrugated, Rankin, and Williams types. Where sheets have been trimmed and rolled the joint is somewhat similar to the Maginnis smooth interior joint. Of the various joints the Maginnis rough interior joint is the least satisfactory and the Hess joint the most satisfactory. For flumes up to No. 96 the corrugated type and the Williams type are very satisfactory. No joints of these latter types on flumes larger than this were observed. The Williams type is the only one that has a packing between the joints and no interior bands.

Very little could be learned as to the tightness of the various joints, as leakage depended so much upon whether the flume was being properly maintained and the condition of the tar coating. Apparently all types of joints can be made reasonably tight. In only one instance, Flume CQ 4.70, has a flume failed by pulling apart or giving way at a joint.

#### MISCELLANEOUS OBSERVATIONS.

An examination of discarded Maginnis sheets showed that invariably they failed by pitting through on the downstream side of joints and that the top of the bead in contact with the channel iron also rusted through.

Several flumes, especially F 13.57 and G 4.02, had been badly distorted by ice. Apparently when the ice in a flume commences to melt it melts first on the sides and where the water can run off the weight rests on the bottom portion of the flume so that the metal and the joint rods are permanently distorted or kinked at the bottom.

In several extreme cases, Flumes AMC 0.12, AB 2.44, and AB 4.11, the pitting of metal had progressed to such an extent that it was necessary to line the bottom of the flume with cement sacks covered with about 1 inch of concrete. This has proven a good method of obtaining an extra year or two of service from small flumes. In a number of places on these flumes 4 to 10 square inches of cement sack are exposed in one patch where the metal is entirely gone.

In tarring the West Canal flumes, which are badly pitted at the joints, about 1 inch of fine gravel and coal tar was placed in the bottom, which may prolong the life of these flumes.

In several instances where the metal had been somewhat weakened at the joints by rusting and pitting, the carrier rods had been tightened until the joint had been pulled in slightly past the normal position. This undoubtedly caused additional strain on the metal and will hasten pitting. There may also be danger of buckling the joints if drawn too tight after the metal is weakened.

## MOSS AND PLANT GROWTH IN CANAL SYSTEMS AND ITS REMOVAL.

By Geo. E. Stratton, Project Manager, Milk River Project, Montana.

THERE probably is more than one species of moss encountered on the Reclamation Service projects. The type of moss met with on the Milk River project grows in long fibers or streamers and promises eventually to become a serious problem in the operation of the canals at the time of peak demand. At the present time the growth is serious only in the laterals, since the demands for water on this project even at the peak period are not yet large enough to tax the main canals to their capacities.

There is also a growth in a few of the laterals, for short stretches through wet areas, of cat-tails and tule, which is entirely distinct from the moss growth, and this growth of cat-tails and tule, as well as of grass, seriously interferes with the operation of wastewater ditches.

### TIME AND EXTENT OF GROWTH.

The growth of moss becomes rank earlier in the season in some years than in others. In 1918 it appeared suddenly about July 1, whereas in 1919 it occurred early in June and developed more gradually. The growth not only reduces the carrying capacity of the canal by increasing the coefficient of roughness, but it also actually chokes up more or less of the canal prism. The Dodson North Canal was reduced in carrying capacity for the same gauge height from 135 second-feet to 55 second-feet, or about 58 per cent, and the Vandalia South Canal from 240 second-feet to 65 second-feet, or about 75 per cent, owing to this growth of moss.

### CONDITION ON MAIN CANALS, MILK RIVER PROJECT.

On the Dodson South Main Canal, with a capacity for the greater part of its length of 500 second-feet, there has been little, if any, trouble from moss. This canal, although operated during the moss period at only a fraction of its capacity, has a higher velocity than some of the other canals on the project, its actual operating velocity during June and July, 1919, being about 1.25 feet per second. There are comparatively few checks on this canal, but near its head are some sloughs, so that in these slough sections and above at least one of the checks the velocity must be small and would seem to provide favorable conditions for the growth of moss. Above the check referred to, however, the water is fairly deep, perhaps 4 feet or more, and it is believed by some that a depth of water of 3 feet or more is some protection against growth of moss. This conclusion however, is not supported by the conditions on the Milk River project in general.

The Dodson North Canal has a flat grade of about

0.00015, or 0.8 foot per mile, and its normal velocity at full capacity is 1.56 feet per second, but it was operated during the moss period of 1919 at a velocity of about 0.5 foot per second. There are frequent checks in the upper reach of this canal which hold the water to the full designed depth of about 4 feet, but these checks contribute to the slow velocity in the canal. The growth of moss in this canal is very rank and reduces the capacity more than half.

Vandalia South Canal, with a designed capacity of 300 second-feet, a fall of 0.69 foot per mile, and a velocity of 1.63 feet per second, has no checks in its first 10 miles. It was, however, operated during the moss portion of the season of 1919 with a flow of only about 50 second-feet, giving an actual velocity of about 0.6 of a foot per second. This canal has shown even more rank growth of moss than the Dodson North Canal, although the laterals under the Vandalia South Canal have been comparatively free from moss.

### CONDITIONS ON LATERALS, MILK RIVER PROJECT.

In 1917 and 1918 there was a good deal of trouble from moss in laterals, especially under the Dodson North Canal, and considerable work was done each year attempting to remove the moss. However, in 1919 these laterals were operated more on a rotation system and little work was required in removing the moss. This probably was due to the fact that the laterals were cleaned more effectively than usual in the spring and to the rotation which gave the sun a chance to dry and kill the moss.

### OTHER PROJECTS.

Last spring letters were written to a number of the project managers where it was understood that troubles had arisen from moss, inquiring as to the methods they had used and the success obtained in removing the moss. The replies received were quite contradictory, some claiming to have good success with a certain method and others that the same method proved entirely useless. It is probable that these contradictory replies may be due to some extent to the fact that the moss was of different types on the different projects or that it was at a different stage of growth, and consequently had different properties; also the conditions of the canal under which the attempts to remove the moss were made may have been dissimilar.

It is generally agreed that a slow velocity promotes the growth of moss, and that muddy water and a fairly good depth of water, perhaps something over 3 or 4 feet, tend to keep the canals free from growth of moss.



## METHODS OF PREVENTING AND REMOVING MOSS.

*Muddy water.*—On some projects at times muddy water has been turned into the canals in the hope that this water would kill the moss, but where tried for a period of two or three weeks especially for this purpose it did not produce the required result. It may be that if muddy water was run at all times in the canals the moss would not have an opportunity to start, or it is possible that if the muddy water was turned into the canals just at the right time, probably at the time the moss began to grow, and was kept in the canals long enough, the moss might be killed, but it does not appear to be a fact that the use of muddy water for a period of only two or three weeks will kill for the season. In any event the use of muddy water to prevent this growth can not ordinarily be controlled at choice, as the operating force is usually obliged to take the water that is available whether muddy or clear. It might in some cases be possible to roil the water artificially. Probably this could be done most conveniently by the use of a hydraulic giant sluicing sediment into the canal, but this would usually be objectionable for several reasons. On the Milk River project the water during the greater part of the irrigation season is very clear, so that there has been no opportunity to observe the effect of muddy water.

*Hand methods.*—On one of the southern projects, where the canals are operated for nearly the entire year, the most satisfactory method found is to shut the water out of the canal, put on a crew of men with shovels, and thoroughly clean the canal. Probably the crew of men with shovels is used instead of teams with scrapers because they can begin work before so much time is lost waiting for the canal to dry out. By that method they are able to free the canal from moss for a considerable length of time, although it is necessary to go through the process twice a year. It is stated that the expense of cleaning in this manner is less than a continuous operation of dragging or of fighting the moss in any other method that had been tried. However, in a canal system 100 miles or so long this would be a very expensive operation and on the Milk River project it would usually be impossible during the operating season to obtain a sufficient crew of men to remove the moss in this manner. A thorough cleaning of the canals in the spring, however, does delay the growth of moss and probably reduces the effect of moss throughout the season.

*Drying canals out and killing moss by the sun.*—Where the grade of the canal is uniform and wasteways are available so that the water can be drained out of the canal quickly this may be done and the canal be allowed to stand for a few days or perhaps a week or more in hot weather so that the sun can dry up and burn the moss. This is believed by some to be an effective procedure in killing the moss. It has not been possible to try this in the main canals on the Milk River project although it is believed that the

growth of moss in the past year on some of the laterals was much reduced by substantially this procedure.

*Submarine saw.*—One or more submarine saws have been manufactured for this purpose, with flexible steel blades designed to lie on the bottom of the canal and be operated in the manner of a crosscut saw, thus cutting the plant growth at the roots. This method has not been tried on the Milk River project. One project reports that it was fairly successful and the canal was cleared of moss at a cost of about \$35 a mile. Another project reports that it was a complete failure; that instead of cutting the moss the saw would mash it down and slide over, as the moss was not stiff enough to be cut with the saw.

*Dragging with spring-tooth harrow.*—This has been used effectively on the Milk River and other projects but was superseded the last season on the Milk River project by the method of dragging by chains. One project claims that the harrow does more harm than good, the objection being that the harrows attack the bottom grade of the canal in the soft places and slide over the harder places with the result that after some time the canal bed and section become much disturbed. In places the bottom of the canal was, after continued use of the harrow, found to be as much as 2½ feet below grade and other portions were undisturbed; the material loosened from the softer places was washed downstream and deposited in bars, which reduced the width and depth of the canal. The subsequent growth of moss was then much increased at the deep portions of the canal, owing probably to the fact that this increase in depth had occasioned a resulting low velocity. This objectionable result of dragging with a harrow has not been met with on the Milk River project.

*Dragging by chains.*—Two projects state that the most effective method they have found was to take a large chain, the heavier the better, and drag this upon the canals by the use of teams on each bank. This method has been used to some extent on the Milk River project for several years. At first ordinary log chains with weights were used, but in the spring of 1919 two chains were made of 1½-inch reinforcing steel with links about 18 inches long. These chains required no weights and proved more effective than the log chains. About 33 miles of canal were dragged with these chains, at a cost of about \$9 per mile, and it was not found necessary to repeat the dragging on any portion of the canal that season. This dragging resulted in considerable improvement in the flow of the canal, but did not by any means entirely free the canal of moss growth. It was intended to use a spring-tooth harrow, for comparative purposes, on some sections of the canal adjacent to those dragged by the chains, but the field force found the use of the chains considerably more convenient and, in their opinion, so much more effective than the harrow that they put off from time to time the use of the harrow,

and the season went by without the desired comparison being made. In any of these processes by dragging or sawing, the moss is merely loosened from the canal bed and banks, and it is still necessary to remove the loosened moss from the canal. On the Milk River project this is done by men stationed at bridges below the section of the canal being cleared, who take out the moss with forks and hooks. It would be desirable to have some properly located wasteways through which the moss could be sluiced out by the use of a boom.

*Dragging with special harrow.*—One of the projects had a special kind of rake or harrow made up with knives set at an angle, and this tool was dragged in the bottom of the canal so as to cut the moss roots close to the ground. No very good description of this tool was furnished, but apparently it did not give much satisfaction and its use was abandoned for the submarine saw or dragging with chains.

*Removal by copper sulphate.*—The use of copper sulphate has been tried on some projects and has

proven successful in removing a growth of algæ in a concrete-lined canal on the Yakima project.<sup>1</sup> In this case, however, there appears to have been a somewhat different species of growth from that encountered on the earth canals on the Milk River project. Copper sulphate has been tried on earth canals on at least two projects, but in neither case with satisfactory results, and each project contemplates further experiments, using more concentrated solutions. It is stated that no objectionable effects were noted on vegetation supplied with water treated by copper sulphate and no other difficulty has developed from the presence of copper in the water. It seems, however, that a solution sufficiently concentrated to kill the moss growth on the canals of the Milk River project would be likely to have a harmful effect upon alfalfa and other crops on which the water so treated was used. Probably this method will be given more extensive trial, and it may develop into a satisfactory process.

<sup>1</sup> See RECLAMATION RECORD, November, 1918, p. 531.

## WORK STARTS ON YUMA AUXILIARY PROJECT.

Col. B. F. Fly Writes of Historic Event.

YUMA ARIZ., October 7, 1920.

DR. HUGH A. BROWN,

Editor RECLAMATION RECORD,

Washington, D. C.

MY DEAR DR. BROWN: Actual construction work is now in progress on "my beloved Yuma Mesa." This work was started on the morning of September 27, under the personal supervision of Messrs. George Bros. & Co., who were the successful bidders on the contract to excavate the first 93,000 cubic yards of earth from the Main Canal. In the absence of Project Manager W. W. Schlecht, who was then on an inspection tour of the Boulder Canyon dam site, the honor of starting this important work fell on his chief assistant engineer, Mr. Sam A. McWilliams, who has had charge of the engineering work on the Yuma Mesa for the past two years or more. Because of the unceasing efforts I have personally put forth to bring about the reclamation of the Yuma Mesa lands I was accorded the honor of holding the handlebar of the Fresno scraper that removed the first dirt from the canal. It was at my signal, that of waving my hat, that the work was begun. I confess that it was one of the proudest acts of my life, and I can but look forward with undiminished interest to the day when the first stream of water is pumped on the Yuma Mesa to reclaim those wonderful lands from their present desert state. If nothing unforeseen happens, we can hope for this great boon by some time in the coming year. On the day that the first irrigation water flows on these lands Yuma will celebrate it in a manner seldom seen in the completion

of reclamation works, for all of our citizens, whether they own lands on the Yuma Mesa or not, realize that this is Yuma's greatest asset, and naturally all of them are on the tiptoe of expectancy over the early completion of this work.



Work begins on Col. Fly's "beloved mesa."

No one could be more grateful than I am for the tremendous help that has been rendered me in this long drawn-out campaign by all my official friends in Washington. Had they not given the matter such cordial support it could never have been made a success. When I first presented the matter to the then "Reclamation Commission," consisting of Director A. P. Davis, Judge Will R. King, and Comptroller Ryan, four years and a half ago, it was looked upon with a good deal of skepticism. However, the upshot



of my first visit to Washington was the introduction of the so-called Yuma Mesa Auxiliary Act. This was introduced in the House by Congressman Carl Hayden, on April 16, 1916. The next day Senator Ashurst introduced the bill in the Senate. It finally passed Congress on January 25, 1917, and was signed that day by President Wilson. Subsequently it developed that the measure needed an amendment, which required about six months to pass through Congress the second time.

The physical survey of the Yuma Mesa was begun, under direction of the then project manager, L. M. Lawson, on April 21, 1917. A photograph of the occasion was taken, showing me in the act of setting the first "bench mark."

Franklin K. Lane, former Secretary of the Interior, than whom no better friend of the West ever lived, signed the final order to sell the Yuma Mesa lands on July 14, 1919. This event was made historical by a photograph showing the Secretary in the act of signing the order, surrounded by a distinguished group of officials, and I an excited and interested looker-on. A photograph showing the "Reclamation Commission" in session and Director Davis passing to me the official announcement that I had won my fight for "my beloved Yuma Mesa," was taken early in March, 1916. Thus step by step all the more important events connected with this big undertaking have been made historical. And now the almost crowning act has taken place. It is a great joy to everybody in Yuma that we are almost in sight of our goal.

No other section of the United States can lay claim to a body of land equal to these Yuma Mesa lands for citrus-fruit purposes. Those who have never seen them can hardly realize what they are. But in the years to come, when the Yuma grapefruit will have become known throughout the United States, it will be known as the finest winter resort in the world. It is the only section of the United States that to all intents is frostless, where the sun shines every day in the year, and where, as I once before had occasion to remark, one does not really need an overcoat in "the good old summer time."

The people of this community can never forget the kindnesses that have been shown them by all the officials in Washington, especially Director A. P. Davis, Assistant Director Morris Blen, Chief Counsel Hamel, Judge Will R. King, Statistician C. J. Blanchard, Mrs. Littlepage, Mr. Beadle, former Secretary Lane, your present admirable Secretary, and your own good self for your many kind words in behalf of "my beloved Yuma Mesa." I wish all of you could come out here and see our wonderful country. You then wouldn't want to live in Washington, or anywhere else, a day longer than necessary to pack your belongings and beat it for Yuma.

Cordially, yours,

BEN FRANKLIN FLY.

## FARM UNIT PLATS.

### Purpose and Preparation.

By P. A. Rosendorn, Senior Draftsman, Washington Office, U. S. R. S.

A FARM unit plat is a diagram of a land-office township plat usually drawn on a scale of 2 inches to the mile, showing lands, both public and private, to be served with water.

The term "farm unit" relates only to a tract of public land fixed as a homestead entry under the reclamation act. The size of the farm unit is determined by the Secretary as the number of acres that will be reasonably required for the support of a family. Where market conditions or the special fitness of the soil and climate for the successful growth of fruit and garden produce warrant, these units may be as small as 10 acres, and in no case can more than 160 acres be included in any farm unit or tract of private land for which water is to be served.

No attempt is made in the preparation of the plats toward minute accuracy from a topographic or geographic point of view, yet the location of such topographic features as the more important streams, canals, towns, and railroad lines are plotted with sufficient care to present a fairly accurate diagram of the area included in the plat.

The finished copy of a plat may convey to the average observer but a meager idea of the effort involved or of the method employed in its production. The various features delineated on the plat represent, so to speak, each successive step taken in the development of the particular project. The area included represents the first step—the withdrawal of the lands from public entry. Only lands withdrawn by the Secretary for reclamation purposes may be entered under the reclamation act; consequently a close scrutiny of records is necessary to avoid showing lands for which water is not available. The figures denoting the irrigable acreage embody practically all of the engineering features resulting from the topographic surveys, location of canal lines, and other irrigation structures.

As soon as the irrigable area to be opened to entry has been definitely determined and the area which in the opinion of the Secretary may be reasonably required for the support of a family fixed, the farm unit boundaries are laid out on the ground, which frequently requires retracement of the section lines and the reestablishment of corners established in the land-office surveys, and plats are prepared showing for each township the lands to be opened to irrigation, both public and private, section and subdivision lines, the latter extending only as far as may be required to show the area under consideration, also railroads, towns, canal lines, the more important streams, and United States reservations.

The boundaries of public-land farm units are indicated by solid black lines drawn slightly within the boundaries of the legal subdivision lines, which form the true boundaries of the units and may include one or more legal subdivisions. The outer boundaries of the entire private land areas are shown by heavy dashed lines, the boundaries of individual tracts being omitted. Where an agreement has been made for the disposition of State or railroad lands under the terms of the reclamation act, such lands are given distinctive boundaries and farm-unit subdivisions are shown the same as for public land, but where no such agreement exists these lands are designated as private.

The letters of the alphabet are used for the designation of the farm units, omitting the letters I and O. Each section is lettered independently, beginning with the letter A at the northeast corner of the section and continuing after the manner of the numbering of sections. Where the number of units in a section exceeds 24, each quarter section is independently lettered, and when a farm unit includes land in more than one township, the designating letter, boundaries, and area appear on the plat containing the larger portion of the unit and the boundaries and designating letters of such units are merely outlined on the adjacent plats.

The irrigable acreage for which water-right application may be made is tabulated on the margin of the plat for each public, State, or railroad land farm unit and for each legal subdivision of private land, the several classes being grouped under appropriate titles.

The farm-unit plat for a given township may, when first issued, show only a few sections of irrigable land. Later, as the project is developed and additional land is placed under irrigation, the original plat is amended by showing thereon the lands previously opened and also the additional areas subsequently placed under irrigation. For example, if a plat is issued in 1918 and a new area opened in 1919 or 1920, both of these areas are shown distinctively in the body of the plat and in the marginal tabulations, and it may be thus ascertained at a glance when any particular farm unit or tract of private land was opened to irrigation. For the purpose of further identification, the areas opened to irrigation at different periods are referred to as project units. For instance, the area opened to irrigation in 1918 would be designated as the first unit and any subsequent opening identified as the second, third, or fourth unit, as the case may be.

A glance at an original drawing of a farm-unit plat may be rather startling to the layman or even to the experienced map maker. It reveals a mass of variously shaped strips of paper pasted in different positions around the sheet, and may present the appearance of a jig-saw puzzle, rather than the expected specimen of the skilled draftsman's effort.

This is due, in a measure, to the introduction of a number of time-saving innovations, such as the printing press and the typewriter.

The number of plats necessary to show the lands to be opened to irrigation varies and may include as many as 25 townships; it may be thus observed that to execute by hand all of the lettering contained in the descriptive matter accompanying each plat would require considerable time and effort. Therefore, and in view of the fact that the descriptive matter is practically the same for each plat for a particular project, the printing press is brought into use and in less time than it would require to letter one plat with the pen all the necessary lettering can be printed, after which it is attached to the plats by the draftsman after the various features have been drawn in. In this connection considerable ingenuity is displayed in placing the printed names along the canal lines, streams, and railroads, which being printed on a straight line are made to conform to the alignment of the objects they are intended to describe. Likewise, the typewriter is made to contribute an important part in the preparation of a plat, as shown in the tabulation of the irrigable areas on the margin. In passing, it may be recalled that considerable interest was displayed by the public, a short time ago, in the attempt of a popular weekly magazine to overcome certain difficulties in connection with its publication by the substitution of the typewriter and photolithography for the typesetting machine: as a matter of fact, this method has been in use by the Reclamation Service for a number of years.

The plats, after being approved by the Secretary of the Interior, are photolithographed and copies filed in the General Land Office and in the local office of the land district in which the lands are situated. They form the official record to which homestead entries and water-right applications must be made to conform.

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There are innumerable examples of farmers whose prosperity has been founded on the production of pure-bred stock. How many farmers do you know whose success is due to scrubs?

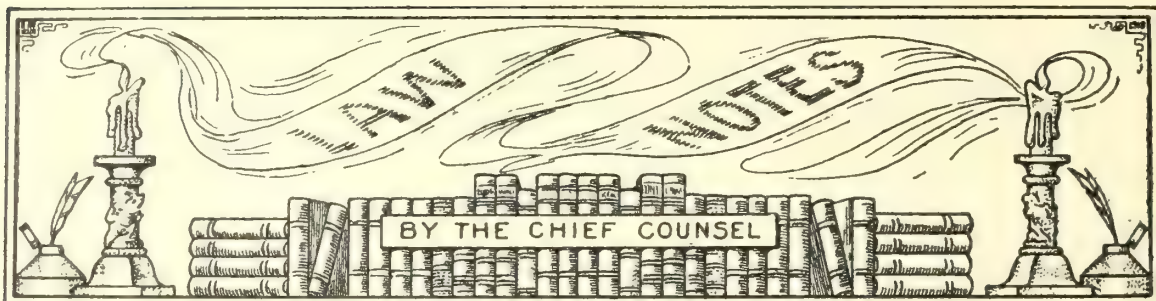
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Agricultural education will do more to lift the farmer to a plane of absolute equality with business and the professions than any movement yet started in this country.

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As the type of animal necessary for the production of large yields of milk is entirely different from that of the beef animals, it has been impossible to produce a breed which would combine these functions and be of superior merit for both purposes.





### Regularity of Proceedings by Irrigation Districts in Oregon.

THE following points have been decided by the Supreme Court of the State of Oregon in the case of Board of Directors of Medford Irrigation District v. Hill (190 Pac. 957), which was a proceeding brought by the board of directors of an irrigation district for a confirmation of the regularity and legality of the organization of the district and the issuance of the bonds of the district, to wit:

In proceedings for the confirmation of the organization of an irrigation district and the issuance of its bonds, which are in the nature of proceedings in rem, the supreme court on appeal from a decree of confirmation must examine every question presented by the record, whether discussed in the briefs or not.

In proceedings to confirm the organization of an irrigation district and the issuance of its bonds, neither the circuit court nor the supreme court have jurisdiction to enter a decree binding on landowners who did not appear, where the hearing was held before the expiration of 10 days after the last publication of the notice, contrary to Laws, 1917 (p. 773, par. 41, subds. a, d).

Though the statutory notice for proceedings for the confirmation of an irrigation district and the issuance of its bonds was not given, the court can determine the legality of the district and the bonds as against the objections of a landowner who appeared and answered.

Under Acts, 1917 (p. 754, par. 19), authorizing election for the issuance of irrigation district bonds for any purpose, the board of directors, in calling the election for a bond issue, must specify in a general way the purpose for which the bonds are to be sold, and can not, after the election, abandon the purpose stated entirely and sell the bonds to finance a totally different plan.

Where the irrigation district act of another State authorized an election for the issuance of district bonds in the amount determined, while the Oregon statute requires an election for the issuance of bonds for any purpose, the legislature can not be held to have adopted a construction previously placed on the act of the other State as not requiring the purpose of the bonds to be stated in the call for election.

The change from the irrigation district act of 1911 requiring submission at election of the question whether the bonds required for the project previously determined shall be issued, to that of Acts, 1917 (p. 754, par. 19), requiring an election for issuance of bonds for any purpose, does not indicate an intention to abolish the necessity of stating the purpose of the bonds in the call for the election.

In stating the purpose for which irrigation district bonds are to be issued, it is not necessary to state more than a general plan, and such plan may be modified or changed in particulars after the bonds are authorized, but can not be completely abandoned and another plan adopted.

Where the resolution of the board of directors of an irrigation district adopted a particular project in one paragraph, and in the next paragraph called an election to authorize a bond issue, the sale of bonds authorized at that election to construct a totally different project from that adopted is invalid, whether the resolution be construed as calling the election to issue bonds for that project or as not stating the purpose of the bond as required by statute.

### Verbal Contract to Carry Water Through Ditch for 99 Years.

The Hoehne Ditch Co., under an appropriation of water from the Las Animas River, in Colorado, made a verbal agreement with the John Flood Ditch Co. whereby the latter agreed to carry through its ditch the waters of the former for a period of 99 years at the agreed price of \$1,000 per year. This verbal contract was fully performed for one irrigation year. Its validity was contested upon the ground that not being in writing it was void under the statute of frauds. In *Hoehne Ditch Co. v. John Flood Ditch Co.* (191 Pac. 108), the Supreme Court of Colorado held the contract to be good, citing *Yunker v. Nicholson* (1 Colo. 551), *McLure v. Koen* (25 Colo. 284; 53 Pac. 1058), *Graybill v. Corlett* (60 Colo. 551; 154 Pac. 730).

### Compensation in Condemnation Cases.

While private property can not be taken, even under the right of eminent domain, unless necessary for public use, and then only if just compensation be paid therefor, yet it is not necessary, in the absence of express constitutional or statutory requirement, that effect, that such compensation be paid before the actual taking of the property, provided that reasonably certain, prompt, and adequate provision for the payment of just compensation be made, or the public faith and purse be pledged for such payment. (In *Condemnations for Improvement of Rouge River*, 20 Fed. 105, citing *Cherokee Nation v. Southern Kansas Railway Co.*, 135 U. S. 641; *Sweet v. Rechel*, 13



GEO. A. WARD.

Counsel, United States Reclamation Service, Washington, D. C.; born in Atchison County, Kans., educated in the public schools of that county, the Kansas State University, and the Georgetown Law School, Washington, D. C., graduating from the latter institution with the degrees of LL. B and LL. M.; was county superintendent of schools and deputy county treasurer of Atchison County, Kans.; practiced law in Atchison, Kans., and in Guthrie, Okla., and was elected a delegate to the convention that prepared the charter of the last-named city; is a member of the bar of several States, the District of Columbia, and the Supreme Court of the United States; has been connected with the Interior Department in a legal capacity more than 20 years, the last 5 years as counsel in the Reclamation Service.



ELBERT WILLIAM R. EWING.

Counsel, United States Reclamation Service, Washington, D. C.; born at Acadia, Va.; graduated from Cumberland College with the A. M. degree, and from the University of Virginia; studied law at the Chicago Law School, receiving the LL. B. degree; engaged for several years in the general practice of law; has been admitted to practice law in six States, in the District of Columbia, and in the Supreme Court of the United States; entered the Government service as title attorney in the Department of Agriculture; is the author of several successful books upon legal and historical subjects, one of which has been used in the law department of eight American universities and some other institutions; in recognition of literary accomplishments has received degree of LL. D.; has been connected with the Reclamation Service for about five years.

U. S. 380; *Adirondack Railway Co. v. People*, 176 U. S. 335; *Crczier v. Krupp*, 224 U. S. 290; *Bragg v. Weaver*, 251 U. S. 57.)

### Appropriation of Water in Utah.

Agreement by irrigation associations, prior appropriators of water, to furnish the use of their joint canal to carry specified amount of water to a point from which secondary appropriator diverted water, in

consideration of the right to enlarge ditch across the latter's land, held not a waiver of prior right to appropriation of such amount of water, though irrigation association continued for some years to supply him with such water. (*Huntsville Irrigation Association et al. v. Rollo et al.*, (Utah) 191 Pac. 423.)

### New York Canal Co. v. Bond.

Contract dated July 1, 1918, made under the act of June 17, 1902 (32 Stat. 388), between the United



States and the New York Canal Co., on behalf of its stockholders for the furnishing of additional water to the lands of such stockholders from the Arrowrock reservoir, Boise project, Idaho, construed, and held valid, and to authorize the charges made against the company for operation and maintenance. (*New York Canal Co. (Ltd.) v. Bond et al.*, (Idaho) 265 Fed. 228.)

### Elimination of Lands from Irrigation District.

Lands can be eliminated from an irrigation district after its organization over the objection of other land-owners in the district only by strictly following the statutory procedure therefor, including the publication of notice; a stipulation between the district and

the owners of the land to be eliminated can not authorize the elimination of the land as against those not parties thereto. (*Board of Directors of Medford Irrigation District v. Hill*, (Oreg.) 190 Pac. 957.)

### W. I. Swanton Admitted to the Bar.

W. I. Swanton of the Washington office of the Reclamation Service, was admitted to the bar of the Supreme Court of the District of Columbia on October 6, 1920, and to the bar of the Court of Appeals of the District on October 7. Mr. Swanton holds the degree of S. B. from the Massachusetts Institute of Technology and the degrees of LL. B. and LL. M. from the National University Law School of Washington, D. C.

—*Ottamar Hamel.*

## ON THE CONDUIT ROAD TO GREAT FALLS.

### The Water Supply of the Nation's Capital.

By W. I. Swanton, U. S. R. S.

ON the last Saturday half holiday in September a party of members of the Home Club, which includes employees of the Interior Department, journeyed to Great Falls by motor truck over the splendid Conduit Road, 14 miles in length, for the closing picnic of the season. This road is so named because it is constructed on the line of the conduit which supplies water to the Nation's Capital, and with the exception of one or two hills at each end it is built on a uniform grade of the conduit of 9 inches to the mile. It is thought that a brief account of this conduit and water supply from the historic Potomac might be of interest to readers of the RECLAMATION RECORD.

Our party left the Interior Department Building at Nineteenth and F Streets a little after 2 o'clock, having been joined by a delegation from the Pension Building, which is located in Judiciary Square, between Fourth and Fifth Streets. In going through Georgetown we passed within full view of the site of Key arch bridge with the steel centering of one of the graceful arches already in position. This bridge is named for Francis Scott Key, the author of the Star Spangled Banner, whose house was on the Georgetown side of the Potomac. The bridge, which is to be 70 feet 6 inches wide and 1,562 feet long, including seven arches and the approaches, will probably be completed in a couple of years and will furnish a beautiful and dignified approach to Fort Myer and Arlington Cemetery, both overlooking the city of Washington from the south side of the Potomac. The channel span will have a length of 208 feet. The cableway used in the construction of this bridge consisted of a single cable 2½ inches in diameter and about 2,000 feet long between anchorages. It is interesting to recall that in

the construction of the Elephant Butte Dam the cableway system consisted of three 24-inch cables of about the same span.



Key bridge under construction.

A little beyond Georgetown we passed the receiving reservoir, from which the water is sent by tunnel to the filtration plant, 4 miles distant on the easterly side of the city, before being distributed to the city mains.

At this Georgetown receiving reservoir we began our ride on the Conduit Road proper, which is a substantially constructed 8-inch macadamized highway 16 feet wide with tarvia surface. This road is a favorite one for motorists and is maintained by the Office of Chief of Engineers of the War Department, under whose supervision is also the water supply of the city of Washington. The District government maintains and operates the distribution system, and the cost of distribution of about 25 billion gallons per year is paid for by the minimum rental charge of \$5.65 for 7,500 cubic feet per year by general consumers, and 5 cents per 100 cubic feet for additional amounts.

The capacity of the single conduit of 65,000,000 gallons per day is taxed to its utmost at the present time

to supply the largely increased population of the city of Washington (437,571, census of 1920), and investigations are now in progress looking to an additional supply of water and a possible power development of the Great Falls of the Potomac.

The aqueduct is a circular conduit, brick lined, with an inside diameter of 9 feet and is about 14 miles in length. Construction was begun in 1853 and water was turned through the aqueduct in 1863.

Some comparison of the size of the Great Falls conduit and some of the conduits constructed by the Reclamation Service may be of interest. The maximum flow of about 65,000,000 gallons per day is but 100 second-feet, and the siphons on the Interstate Canal have capacities of 1,400 second-feet; that on the San River at Simms Creek is but 5 feet 1½ inches in diameter and has a capacity of about 175 second-feet.

Just beyond the receiving reservoir is located the Delcarlin Reservoir, which is used as a sedimentation basin during flood seasons of the Potomac. About half the distance to the Falls we passed over the celebrated Cabin John Bridge, which at the time it was constructed, about 1855, was the longest stone masonry arch in the world, with a span of 220 feet. It was 7 miles more of smooth, dustless riding to the inlet works at Great Falls, and the entire run of about 14 miles was made by our careful chauffeur, who had seen service in France, in a little over an hour.

On arriving at the terminus our party scattered in various directions, some for a walk up the winding towpath of the Chesapeake & Ohio Canal, others to watch the locking of the coal boats up the canal on their 4 or 5 day trip to Cumberland, Md., 185 miles from the city; and others ventured out on the wooded island, and clambered over the rocky ledges to secure a good view of the Great Falls of the Potomac. As the suspension bridge to the island was crossed, the Government Dam and intake works could be seen. The crest of this dam is 150.5 feet above datum at tide water at Georgetown. Due to the frequent summer rains, the Potomac was high, but the records for many years show that the unregulated minimum flow of the river at this point is at times less than 1,000 second-feet, and the mean is in the neighborhood of about 10,000 second-feet.

After a few hours at the Falls and a picnic supper in the yard of a quaint stone house built before the Civil War on the banks of the canal, we motored home by way of Glen Echo (a resort a short distance outside of the District), where the younger members of our party stopped for dancing. Thus ended the Saturday half-holiday outings of the Home Club, under the efficient management of Miss Peacock, of the Geological Survey Library.

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**Work and Save. Buy Government Securities.**

## RECLAMATION ABROAD.

### Australia.

#### IRRIGATED FRUIT DISTRICT IN VICTORIA.

Of the 18 districts which market their fruit through the Australian Dried Fruits Association, the largest is Mildura, the original irrigated fruit colony, on the Victorian side of the Murray. The watering of this land is controlled and conducted by the Mildura Irrigation Trust, with jurisdiction over 45,000 acres, of which 12,300 are planted. The trust is managed by a board of commissioners elected by the settlers themselves. It has 70 miles of mains, 100 miles of laterals, and 207 miles of subsidiary channels, with five batteries of pumps, which are capable of raising 30,000 cubic feet of water a minute. The Mildura district last year produced 3,535 tons of currants, 4,788 tons of sultanas, and 1,574 tons of leixias; sent 150,000 cases of fresh fruits to market and 5,500 tons of grapes to wineries and canned 850 tons.

The Merbein irrigation area, located in the shire of Mildura and irrigated by a pumping plant installed by the Victorian Government, has 7,000 acres planted with vines and trees. A soldier settlement was established here in 1917 when Government assistance was granted to men returned from the war and who wanted to go on the land. Merbein has a large cooperative packing plant and a winery and distillery at which large quantities of brandy are manufactured annually.

A third irrigation district in the vicinity of Mildura is Nyah, a cooperative settlement, which was originally devoted to citrus fruits but is being converted into a vine country, and has 950 acres given up to raisins. A returned-soldiers' settlement has been recently established at Nyah.

#### FRUIT SECTIONS OF ADJOINING STATES.

Across the line in South Australia is Renmark, with 3,000 persons raising fruit on 5,000 irrigated acres so successfully that land there sells at \$1,460 an acre. Additional settlements near Renmark are being planned, including one of 14,000 acres for returned soldiers. Renmark has a distillery as well as a packing plant. Raisin grapes are also produced in considerable quantities at Clare, 89 miles north of Adelaide, South Australia. Other South Australian settlements included in the Australian Dried Fruits Association are Berri, with a pumping plant equal to 1,000,000 gallons per hour, Pyap, Warkerie, and Angaston.

On the New South Wales side of the river is Curlwaa, a Government settlement of 1,318 irrigated acres.

All these irrigated districts are to be extended, and will probably receive great assistance from the new Murray River irrigation works, which are being constructed jointly by the Governments of Victoria, New South Wales, and South Australia.—*Commerce Reports.*



# IRRIGATION STATISTICS, FOURTEENTH CENSUS.

The Director of the Census announces, subject to correction, the following preliminary statistics on irrigation for the counties named. Similar statements for

other counties will be issued as soon as the figures are available and will be published from time to time in the RECLAMATION RECORD.

## Irrigation by counties, 1920 and 1910.

State and county.	Acreage to be irrigated by works either completed or under construction.			Acreage to which existing works are capable of supplying water.			Acreage irrigated.			Acreage available for settlement in 1920. <sup>1</sup>
	1920	1910	Increase (- sign denotes decrease).	1920	1910	Increase (- sign denotes decrease).	1919	1909	Increase (- sign denotes decrease).	
Clark County, Idaho <sup>2</sup> .....	46,294			26,827			19,211			7,280
Fremont County, Idaho.....	221,835			191,352			129,824			
Gooding County, Idaho <sup>3</sup> .....	100,386			90,597			52,573			33,452
Jefferson County, Idaho <sup>4</sup> .....	236,908			177,215			133,451			22,225
Jerome County, Idaho <sup>5</sup> .....	110,000			110,000			85,000			17,647
Lincoln County, Idaho <sup>6</sup> .....	125,276			121,304			69,620			26,250
Madison County, Idaho <sup>7</sup> .....	68,257			60,784			54,562			
Box Butte County, Nebr.....	3,802	1,373	2,429	3,602	1,173	1,889	2,242	1,171	1,071	
Chase County, Nebr.....	6,391	6,187	204	6,211	4,767	1,444	3,292	3,292	3,226	66
Dawes County, Nebr.....	20,830	12,896	7,934	15,751	12,389	3,362	6,694	7,029	-335	
Dundy County, Nebr.....	7,775	6,121	1,654	4,575	6,006	-1,431	2,625	3,069	-444	
Hitchcock County, Nebr.....	10,576	21,250	10,674	10,226	12,850	2,624	9,786	12,210	2,424	
Red Willow County, Nebr. <sup>8</sup> .....	4,928			4,700			4,013			
Sherman County, Nebr. <sup>9</sup> .....	1,500			1,200			850			
Asotin County, Wash.....	4,684	9,844	-5,160	4,559	5,373	-814	3,474	3,179	295	
Clallam County, Wash.....	12,660	9,975	2,685	9,860	4,405	5,455	6,160	4,265	1,895	2,500
Douglas County, Wash.....	8,756	12,826	-4,070	4,963	8,365	-3,402	4,822	3,317	1,505	1,603
Franklin County, Wash.....	14,248	2,113	12,138	9,994	1,276	8,718	2,233	830	1,403	10,500
Garfield County, Wash.....	1,698	2,283	-585	1,552	1,728	-176	883	1,316	433	
Lincoln County, Wash.....	3,291	2,935	356	2,438	2,404	434	2,239	2,217	22	
Fremont County, Wyo. <sup>11</sup> .....	367,851			194,845			113,256			85,760

<sup>1</sup> To be supplied with water by works either completed or under construction.

<sup>2</sup> Clark County was organized from a part of Fremont County in February, 1919, and consequently no comparative figures for 1910 can be given.

<sup>3</sup> Fremont County was divided in 1914, 1915, 1917, and 1919, Butte, Clark, Jefferson, Madison, and Teton Counties having been organized in whole or in part from the territory which formed Fremont County in 1910; consequently no comparative figures for 1910 can be given.

<sup>4</sup> Gooding County was organized in 1913 from a part of Lincoln County, and was subdivided in 1919, a part of its territory forming a part of Jerome County; consequently no comparative figures for 1910 can be given.

<sup>5</sup> Jefferson County was organized in January, 1914, from a part of Fremont County; consequently no comparative figures for 1910 can be given.

<sup>6</sup> Jerome County was organized in 1919 from parts of Gooding, Lincoln, and Minidoka Counties; consequently no comparative figures for 1910 can be given.

<sup>7</sup> Lincoln County was divided in 1913, Gooding County being organized from a part of its territory. It was further subdivided in 1919 when a part of its territory was placed in Jerome County. Because of these changes, no comparative figures for 1910 can be given.

<sup>8</sup> Madison County was organized in 1914 from a part of Fremont County; consequently no comparative figures for 1910 are available.

<sup>9</sup> Irrigation figures for Red Willow County were not reported separately in 1910; consequently no comparative figures for 1910 can be given.

<sup>10</sup> Irrigation figures for Sherman County were not reported separately in 1910; consequently no comparative figures for 1910 can be given.

<sup>11</sup> Fremont County was divided in 1913, a part of its territory being included in Hot Springs County; consequently no comparative figures for 1910 can be given.

## FIELD DAY, UMATILLA PROJECT.

By H. K. Dean, Superintendent Umatilla Experiment Farm.

THE annual Umatilla Project Field Day was held at the Umatilla Experiment Farm on September 11. Over 1,000 people partook of the lunch served at noon by a committee of town and country ladies. The Hermiston Boys' Band furnished music while the people ate.

The speakers were Congressman Sinnott, of Oregon, Director Jardine, of the Oregon Experiment Stations, and Prof. Hyslop, of the Oregon Agricultural College.

Following the speaking Supt. H. K. Dean, of the Experiment Farm, conducted the visitors over the experimental flats and explained the results of the work.

Congressman Sinnott, talking on the past and future of reclamation work, explained the attitude of the East toward reclamation by irrigation and said

that an extensive educational program should be carried on in the East to make the people realize the value of irrigation.

Director Jardine told of plans for extending the work of the Umatilla Project Experiment Farm on a new piece of land containing 180 acres, as the present farm is too small to allow field trials of the plat results.

Prof. Hyslop reviewed the work on alfalfa and pointed out the value of the higher-priced seed varieties for seed production.

The ladies of the project had an extensive exhibit of the work which they had accomplished during the past year through the Home Demonstration Bureau, assisted by the Home Demonstration Agent, Miss Ella Harmon.

## BULLETINS FOR THE FARMER.

Distributed by the Department of Agriculture, Washington, D. C.

## FARMERS' BULLETINS.

No. 572. *A system of farm-cost accounting.*—This bulletin explains a system of farm-cost accounting, plainly, and yet comprehensively, and offers detailed information that will enable any farmer to make an inventory, open his books, carry his accounts through successfully, and close his books at the end of the year.

No. 684. *Squab raising.*—The general management of pigeons for the production of squabs for market is described in this illustrated bulletin.

No. 1085. *Hog lice and hog mange.*—This illustrated bulletin describes methods of control and eradication, and includes plans of hog wallows and dipping plants, together with directions for building them and for dipping hogs.

No. 1103. *Growing irrigated grain in southern Idaho.*—Cereals constitute some of the most important cash and feed crops grown on the irrigated lands of southern Idaho. The growing of these crops is essential to the live-stock industry and also to the safe diversification and proper rotation of crops. Our Boise, King Hill, and Minidoka project farmers will be interested in this illustrated bulletin.

No. 1105. *Care of mature fowls.*—This and the two succeeding bulletins have been written briefly and in simple terms for the beginner, and especially for members of the Boys' and Girls' Poultry Clubs. This bulletin points out the care which mature fowls should have in order to give best returns for the feed and attention they receive.

No. 1114. *Common poultry diseases.*—Gapes, roup, chicken pox, and scaly leg are discussed in this bulletin.

No. 1116. *Selection and care of poultry-breeding stock.*—This bulletin gives information that should lead to the production of an ample supply of good eggs for hatching.

No. 1127. *Peanut growing for profit.*—Peanuts have become one of the best money crops for use in rotation with cotton and other farm crops in the fight against the boll weevil. The area adapted to their production includes southern California, Arizona, and New Mexico, as well as the strictly Southern States.

No. 1128. *Control of aphids injurious to orchard fruits, currant, gooseberry, and grape.*—The control of aphids, or plant lice, is an ever-recurring problem to the grower of orchard and bush fruits. This illustrated bulletin is of interest to orchardists, vineyardists, and growers of currants and gooseberries in all parts of the United States.

No. 1132. *Planning the farmstead.*—The object of this illustrated bulletin is to set forth general prin-

ciples involved in planning the arrangement of the buildings of the farmstead in their relation to one another.

No. 1146. *Dourine of horses.*—The cause, symptoms, diagnosis, treatment, and method of eradication of this disease are discussed in this bulletin.

No. 1175. *Better seed corn.*—Corn yields can be increased more surely and more cheaply by the use of better seed than in any other way. This illustrated bulletin may be of material help to you financially.

## DEPARTMENT BULLETINS.

No. 823. *Experiments with Kherson and Sixty, day oats.*—This illustrated bulletin assembles the available data concerning the adaptability of these varieties to the different sections of the United States and their value in comparison with other oats.

No. 860. *The organization of cooperative grain elevator companies.*—This bulletin is primarily intended to furnish a plan of organization and method of procedure for persons required to assist in the formation of cooperative grain elevator companies. It should be of interest to producers contemplating organization, to ordinary private corporation types of farmers' elevators desiring to reorganize on the cooperative plan, and to persons interested in cooperative organization in general.

No. 873. *The shrinkage of market hay.*—This bulletin gives data on the average water content of several kinds of hay at harvest time; the loss of water and dry matter during the curing process; and the loss during the time the hay is stored; and points out when shrinkage in hay is an actual loss and when this loss affects, and when the apparent loss is not a real loss, but is simply a natural result of the normal curing process that all good hay must undergo.

No. 913. *The western farmer's water right.*—The object of this bulletin is to give a general knowledge of water rights. It does not discuss fundamental principles and theories, but rather describes those features of water rights with which every person who farms or intends to farm where irrigation is practiced should be familiar.

## Distributed by State Experiment Stations.

NORTH DAKOTA CIRCULARS, AGRICULTURAL COLLEGE,  
N. DAK.

No. 34. *Marquis versus Durum wheats.*

No. 35. *Managing sheep on North Dakota farms. Sheep troubles and remedies.*



## The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year (75 cents a year on and after Jan. 1, 1921), payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 15th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

### SUBSCRIPTION BLANK.

#### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

\_\_\_\_\_, 1920.  
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DEAR SIR: I am NOT a water user on one of the projects of the U. S. Reclamation Service, but wish to receive the RECLAMATION RECORD each month.

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The RECORD is of great value to project farmers and farmers in general, and its contributors are men of recognized standing in the agricultural world.

### SOIL STEALS WATER FROM IRRIGATION CANALS.

That water is stolen from irrigation canals by the soil in much the same way that a lump of sugar takes up water from a glass when a corner of the lump is held in the water by the force known as capillary attraction—has been shown by a series of experiments recently conducted by the United States Department of Agriculture. It has long been observed that unlined reservoirs on irrigation canals lose more water than can be accounted for by direct percolation and evaporation, and a desire to study the cause of this additional loss was one of the reasons for making this investigation.

Accurate information has also been lacking as to how water applied in irrigation is distributed through the soil. Many perplexities are cleared up by tests conducted by the United States Department of Agriculture, in which columns of soil contained in especially devised flumes, each with one plate-glass side, were used to observe the rate at which moisture traveled.

It was found that where soil is in contact with a body of free water it will take up water with remarkable rapidity until the soil approaches saturation. The vertical distance through which water can be lifted by capillarity is very limited, however, not exceeding 3 or 4 feet in most soils. It was also found that while water will move very rapidly from a body of free water to a dry soil, the movement from a wet soil to a dry soil is very gradual.

#### A "CAPILLARY SIPHON."

In the case of flumes inclined downward water drawn into the soil column by capillarity appeared, after a few days, as free water dripping from the flume, thus establishing a "capillary siphon." This indicates that where a canal is located along a side hill water may be drawn out by capillarity continuously and may result in the water-logging of land farther down. Such a condition might be expected where there is a topsoil of rather high capillary power and an impervious subsoil, both sloping downward from the canal at an angle of 15 degrees or more. If under these conditions there were a sudden change in the slope of the ground toward the horizontal, a swampy condition would be likely to result. Such conditions should be avoided, so far as possible, in the location of canals.

Wild ducks can be successfully propagated in many marshy localities. The United States Department of Agriculture has issued a new circular telling the most practicable breeds and how to handle them.

## BOOKS REVIEWED.

HELPING MEN OWN FARMS: A PRACTICAL DISCUSSION OF GOVERNMENT AID IN LAND SETTLEMENT. By Elwood Mead, Professor of Rural Institutions, University of California, and former Chairman, State Rivers and Water Supply Commission, Victoria, Australia. New York: The MacMillan Co., 1920. Cloth: 5½ x 7¼ in.; pp. 228; illustrated.

Community development in Australia became familiar to Prof. Mead during his service on an Australian commission charged with rural colonization. Largely through his influence the California State Legislature in 1917 made an appropriation for a demonstration of planned rural development in that State. The book deals with the development of the State Land Settlement at Durham, Calif., which consists of about 100 farms, varying in size from 20 to 160 acres, the average being about 40 acres, and 26 farm laborers' lots of 2 acres each. The necessity for cooperation in order to make small-scale farming pay, and its obvious advantages in many phases of rural life, are shown. These advantages may be obtained only through community organization as opposed to the policy heretofore prevailing in the United States whereby land ownership goes to those who have the money to buy it in any quantity, regardless of the civilization that may be developed upon it. Within a few years, the author predicts, a town boomed by a real estate speculator and a town and country planned by a State board will show by their difference that Californians were not unmindful of their responsibilities.

A chapter is devoted to community farms for soldiers along the lines so successfully demonstrated at Durham. Several soldier-settlement bills embodying this plan advocating Government aid and direction were introduced in the Sixty-sixth Congress, but failed of passage. There are few opportunities for planned rural development equal to those ignored in the Atlantic seaboard States, and the author expresses the belief that the Government will yet take some part in this development, in the interest of ex-service men, rather than to provide for a direct loan leaving each individual to look out for himself.—W. V. S.

Wheat may be cut with safety when the straw has lost nearly all its green color and the grains are not entirely hardened. If cut sooner than this, shriveled kernels will result. If left standing until fully ripe, a bleached appearance, due to the action of the elements, often results, and loss from shattering may ensue.

There are two kinds of dollars—one that is never worth more than a hundred cents, and one that grows in value. When you put your money in War-Savings Stamps you change your hundred-cent dollars into the kind that grow.

## SEPTEMBER WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

September, as a whole, had seasonable weather, though conditions varied considerably from week to week. The month opened warm in most of the Western States, and the latter part of the middle decade was especially warm for September in the plateau States and to eastward; but a marked change of temperature followed, so that the last decade was mainly cool to westward of the plains States. The month averaged a little warmer than normal near and to eastward of the Rocky Mountain divide, also near the Canadian border; but generally a little cooler than normal in the Plateau States and California.

During the first week there was much rain in Wyoming, Colorado, and a few other districts, with large amounts for the season over portions of the southern plains. The second week was marked by liberal rains over the far Northwest. The final 10 days brought rains to a great many areas, but especially to Montana and northern Utah and again to the far Northwest. The month, as a whole, had more rain than usual in western Texas and thence northward as far as the Arkansas River in Colorado and western Kansas, in northwestern Nebraska, and in northeastern Utah, western Wyoming, and southeastern Idaho; also especially in the regions west of the divide and north of the 45th parallel. On the other hand, most of Arizona and New Mexico, and nearly all of California, Nevada, and southern Utah had less rain than normal, though normally at this season they have less rain than almost all other parts of the country.

In the Western States, especially the Rocky Mountain and plateau regions, frosts did some harm, mainly to late truck and to alfalfa seed, during the latter part of the month. Ranges in a few localities needed rain, but live stock maintained satisfactory condition almost everywhere. The harvesting of fruit made good progress, but the frequent rains in parts of Oregon and Washington considerably damaged prunes. Thrashing of late grain in portions of the far Northwest was delayed by rainy weather, but seeding of the new crop went on favorably in practically all districts.

In 1920, 6,000 acres of flax were cultivated in the United States, as against 5,000 acres in 1919, the United States Department of Agriculture estimates. Wisconsin, Minnesota, Michigan, and the Willamette Valley of Oregon lead in production. The 1920 crop is valued at \$1,600,000.



## MONTHLY PROGRESS REPORTS FOR SEPTEMBER.

Monthly conditions of principal Reclamation Service reservoirs for September, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity, in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate ill. <sup>2</sup>	Begin-ning of month.	End of month.	Maxi-mum.		Begin-ning of month.	End of month.	Maxi-mum.
Arizona, Salt River.....	Roosevelt <sup>3</sup> .....	1,305,000	2128	1903	1,081,672	984,705	1,081,672	100,191	2110.05	2103.41	2110.05
California, Orland.....	East Park.....	51,000	1199.68	1111.68	1,045	300	1,045	712	1140.78	1132.31	1140.78
Idaho.....											
Borise.....	Arrowrock.....	280,000	3211	2956	16,837	.....	16,837	54,256	3049.9	2967	3049.9
	Deer Flat.....	177,000	2518	2188	18,710	11,296	18,710	13,002	2494.4	2492	2494.4
Minidoka.....	Lake Walcott.....	95,180	4245	4236	103,020	92,860	107,110	202,697	4245.65	4244.8	4245.99
	Jackson Lake.....	847,000	6769	6730	144,240	142,920	144,240	38,562	6738.02	6737.95	6738.02
Montana.....											
Milk River.....	Nelson.....	27,000	2212	2200	27,900	26,000	27,900	.....	2212.2	2211.6	2212.2
	St. Mary Storage.....	33,000	4788	4720	5,000	5,000	5,000	.....	4735	4735	4735
	Sun River.....	16,700	4130	4085	12,591	10,942	12,591	1,700	4125.7	4123.7	4125.7
Nebraska-Wyoming, North Platte.....	Pathfinder.....	1,070,000	5852	5670	767,690	658,890	767,690	134,620	5836.64	5829.8	5836.64
	Lake Alice.....	11,400	4182	4159	5,853	7,829	7,829	.....	4173.8	4177	4177
	Lake Minatare.....	60,700	4125	4074	18,348	18,106	18,348	.....	4100.2	4100	4100.2
Nevada, Newlands.....	Lake Tahoe.....	120,000	6230	6224	.....	.....	.....	.....	6225.24	6224.7	6225.24
	Lahontan.....	290,000	4162	4060	118,200	89,280	118,200	32,614	4139.5	4133.2	4139.5
New Mexico.....											
Carlbad.....	McMillan.....	45,000	3267.7	3241.6	24,500	17,000	24,500	7,800	3263.7	3261.7	3263.7
	Rio Grande.....	2,638,800	4407	4321.5	1,952,609	1,818,559	1,952,609	109,721	4388.2	4383.95	4388.2
Oregon, Umatilla.....	Cold Spring.....	50,000	621.5	360	9,400	5,875	9,400	3,560	583.98	578.18	583.98
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4516	264,000	256,000	264,000	.....	4531.9	4531.5	4531.9
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	152,700	139,140	152,700	13,560	2968.1	2966.1	2968.1
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	204,000	191,000	238,000	13,000	7551.9	7550.1	7558
Washington.....											
Okanogan.....	Conconully.....	13,000	2287	2232	.....	.....	.....	767	2237	2237	2237
	Bumping Lake.....	34,000	3126	3389	15,695	9,730	15,695	5,965	3410.1	3403.2	3410.1
Yakama.....	Lake Clealum.....	22,800	2134	2122	16,040	17,565	20,900	3,335	2130.3	2131	2132.6
	Lake Kachess.....	210,000	2258	2192	139,130	97,995	139,130	41,135	2438.2	2427	2438.2
	Lake Keechelus.....	152,000	2515	2425	22,195	13,185	22,195	9,010	2442.4	2435.4	2442.4
Wyoming, Shoshone.....	Shoshone.....	456,600	3360	5132.3	455,265	444,680	455,265	44,915	5359.8	5358.2	5359.8

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2<sup>1</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>2</sup> Proposed regulation.<sup>3</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*—Water was run in all of the canals during September. The demand for irrigation water was not so heavy as in July and August; the peak of the irrigation season ended September 30, 1920, being reached on July 14.

Six maintenance crews were in the field during the month, and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men, 278; average head of stock, 58; miles main canals cleaned, 67½; miles laterals cleaned, 229½; number of new structures installed, 17; number of old structures repaired, 205; riprap placed, 3,481 feet; dirt fill placed, 4,044 cubic yards; concrete placed, 11½ cubic yards; concrete pipe laid, 322 feet; corrugated pipe laid, 185 feet; waste ditches constructed, 1 mile.

Seventy-six head of stock were used from September 10 to 30 widening the Eastern Canal near station 100, moving approximately 8,953 cubic yards at a cost of 35 cents per cubic yard.

The P. & H. ½-yard dragline was repaired and moved to the Arizona Canal at the head of Lateral 16, where it will begin berming the canal from this point to the end at Lateral 20.

The Marion ¾-yard dragline was engaged in widening the Eastern Canal and moved 2,858 cubic yards of dirt for approximately 26 cents per cubic yard.

The Ruth dredge was engaged in berming the east branch of the Consolidated Canal below Lateral 16, moving approximately 2,525 cubic yards of dirt.

*Operation of power system.*—The total power generated for the month was 6,605,020 kilowatt hours. The Roosevelt, Cross Cut, and South Consolidated power plants operated continuously during the month. The Arizona Falls plant operated 97.2 per cent of the month and the Chandler plant 99.5 per cent.

All substations operated during the month without any serious trouble.

All pumping plants were available as needed except for short shutdowns in several of the plants for necessary repair work.

*Construction work, Phoenix-Mesa telephone line.*—Progress on this work was slow during the month, owing to other rush work. The digging of holes was completed. The poles were all set except on the High-line pumping plant leg. The wires were strung from Phoenix to the Grand Canal.

*Scottsdale Ginning Co. connection.*—This line was completed and service connected.

*Sixty-cycle line to Tempe.*—A temporary 11,000-volt, 60-cycle line from the new packing plant 5 miles east of Phoenix to Tempe was constructed, utilizing the old cement mill line and the steel poles of existing lines where possible. Service was commenced on this line on September 25.

*Mesa City, old plant.*—Work continued on the preparations for the installation of the 550-horsepower synchronous motor. The electrical part of this work was practically completed. The old machinery was moved out of the way and the foundation excavation for motor completed.—C. C. Cragin.

## YUMA PROJECT, ARIZONA-CALIFORNIA.

September weather conditions were favorable. A heavy rain occurred on the 15th.

Labor conditions were fair, a sufficient supply of cotton pickers being reported at a rate of 2 cents per pound.

**Construction.**—On the East Drain Lateral, Yuma Valley drainage, the Bucyrus drag line moved 25,110 cubic yards of material, station 53 to station 68+50. A timber bridge 75 feet long was built across the Main Drain at Fourteenth Street.

**Operation and maintenance.**—Twelve thousand acre-feet of water were delivered to 18,000 acres. Monighan drag line No. 1 cleaned 11,100 cubic yards of silt from the Central Main Canal, station 195 to station 256+58, completing the work on this canal. Monighan drag line No. 1 cleaned 8,200 cubic yards of silt from the West Main Canal, station 1130 to station 1168.

The Ruth dredger cleaned 5.3 miles of laterals on the Yuma Indian Reservation, excavating 5,200 cubic yards of silt.

The maximum discharge of the Colorado River during the month was 13,300 second-feet, minimum 5,300 second-feet. The gauge reading on September 30 was 15.55, with a discharge of 5,700 second-feet. The total discharge for the month was 501,400 acre-feet.

**Arizona cooperative work.**—Work was continued on the office work for the relocation of the Arizona Eastern Railroad around the San Carlos Reservoir.

**Boulder Canyon Reservoir.**—The topographic survey of the Boulder Canyon dam site was completed about the 10th, and work was commenced on topographic surveys of the reservoir site at a point about 25 miles above the mouth of the Virgin River. Drilling was begun at the dam site. In the office, studies were made and data collected on various possible irrigation projects on the Colorado River below Boulder Canyon.

**Imperial Valley investigation.**—Surveys for branches of the proposed All-American Canal were continued, 139 miles of line being run during the month. Field work on the soil survey was begun September 29.

A. T. Strahorn, of the Department of Agriculture, visited the project the latter part of the month in connection with the soil survey of the Imperial Valley.—*R. M. Priest.*

## YUMA AUXILIARY PROJECT, ARIZONA.

September weather conditions were quite favorable. On September 15 a heavy rainfall occurred, the gauge at the State University experimental farm on the mesa recording a fall of 2.31 inches.

The engineering force employed divided their time between field canal location and office computations. Final location was made of the supply canal and laterals and data for the design of all structures on the lateral system were completed and submitted to the Denver office.

George Co., contractors for earthwork under specifications No. 388, contract No. 832, commenced work on schedule 1, Supply Canal, on September 27, with four fresno teams and increased the force to nine fresno teams by the end of the month.—*W. W. Schlecht.*

## ORLAND PROJECT, CALIFORNIA.

There were a few days of unusually hot weather during September, but for the most part conditions were normal. There was no rainfall. Storage water was exhausted on the 14th, but a small amount of drainage from the creek bed was available for irri-

gation. The total amount of water available, however, for the month was only 430 acre-feet. With the exception of a limited amount of alfalfa and the completion of the almond and late fruit crops, no crops were harvested. The annual Glenn County fair opened on the 27th, to continue for six days. The general exhibits, commercial, live stock, and agricultural, were better than for any previous fair. It is estimated that the attendance for the first four days was 30,000. There was a meeting of the landowners on a portion of the project on the evening of the 25th for the purpose of discussing the possibilities of securing a supplemental water supply for the project, should the drought conditions which have prevailed for the past five years continue or be repeated.

A small force of men and teams was employed during the last 10 days of the month in cleaning and repairing the East Park Feed Canal. Most of the ditch-riding force were employed on maintenance work during the latter part of the month. Four hundred and ninety-three cubic yards of gravel were delivered at points along the South Canal preparatory to resuming the placing of concrete lining.

Chief Counsel Ottamar Hamele visited the project on the 11th.—*A. N. Burch.*

## Prevailing crop prices at close of September, 1920.

Project.	Alfalfa hay, per ton.		Bar- ley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Potas- sides, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	{ \$16.00 18.00	{ \$24.00 28.00	\$1.50		\$2.40	
Yuma.....	20.00	28.00				
Orland.....	20.00	25.00	.90		2.10	
Grand Valley.....	20.00	24.00	1.90	\$1.00	1.75	\$0.70
Uncompahgre.....	{ 8.00 12.00		1.50	1.15	1.90	.75
Boise.....	9.00	15.00	.80	1.00	1.90	.80
King Hill.....	12.00	17.00		.96		1.20
Mundaka.....	8.00	12.00	.91	.64	1.98	.75
Huntley.....	10.00	15.00		.80	2.05	1.80
Milk River.....	12.00	17.00	.60	.35	2.07	2.10
Sun River.....	14.00	19.00	.65	.50	1.93	1.20
Lower Yellowstone.....	15.00		1.00	.90	1.98	1.25
North Platte.....						
Newlands.....	15.00	21.00	1.05		2.00	1.80
Carlsbad.....	{ 18.00 22.00				2.10	
Rio Grande.....		25.00		.90	2.28	
North Dakota pumping.....						
Umatilla.....		19.00				1.50
Klamath.....	20.00		.96	.80	1.98	
Belle Fourche.....	8.00	16.00		.50	1.90	1.20
Strawberry Valley ..	17.50	20.00	1.45	1.00	1.80	.60
Okanogan.....	30.00					1.50
Yakima:						
Sunnyside unit.....		19.00				.94
Tieton unit.....		19.00				.94
Riverton.....	12.50				1.56	.90
Shoshone.....	10.00	13.00		.80	1.65	.84
Indian projects:						
Blackfeet.....			.47	.31	1.76	
Flathead.....	20.00	25.00		2.00	1.58	1.20
Fort Peck.....	15.00	20.00		1.00	2.00	3.60

## GRAND VALLEY PROJECT, COLORADO.

Seasonable weather prevailed during September and conditions were generally favorable for construction work as well as for farming operations. Labor was scarce on account of the increased demand for men in the orchards and harvest fields.



Good progress was made by the farmers in harvesting their crops. The third cutting of alfalfa was nearly all in the stack. Thrashing of oats and wheat was still in progress and digging of sugar beets had been started. A light frost on the 26th slightly damaged tomatoes and other sensitive crops in some localities, but large quantities of tomatoes were still being shipped to the local cannery. The peach crop in the upper valley had been harvested and marketed. The yield was only about 50 per cent of the normal but record-breaking prices were received. The picking of apples and late pears was under way. The yield was fair but prices were low.

On account of rains early in the month the demand for irrigation water rapidly decreased. The system was in continuous operation, delivering about 3,000 acre-feet to the project and 2,500 acre-feet to the irrigation districts. No operation difficulties were experienced and there were no interruptions in water service except as required to complete minor repairs on the laterals. Two small maintenance crews were employed in cleaning and repairing laterals and installing minor structures.

Drainage construction was continued with three dragline excavators and one trenching machine. One and six-tenths miles of open drain were completed, involving 43,000 cubic yards of excavation. One machine was employed on project lands and the others on the cooperative work in the Grand Valley drainage district. One field party continued drainage investigations on the project.

Chief Counsel Hamel visited the project on the 20th, and Carlos A. Volpi, an engineer detailed by the Argentine Government to study the irrigation projects of the Reclamation Service, spent several days on the project.—*S. O. Harper.*

#### UNCOMPAHGRE PROJECT, COLORADO.

Normal climatic conditions for the month of September were favorable for the maturing of most crops. The first killing frost was on the night of September 25, following a rainfall of about one-half inch over a greater part of the project. Some cornfields and late truck patches were the only crops injured by the frost.

Harvesting has progressed along normal lines. Digging of potatoes has been more general over the project than the previous month, although the amount moved to market has probably not exceeded that of August. The price, however, has gradually declined until buyers were offering from \$1.15 to \$1.20 per hundred at the close of the month.

The peach and pear crops were gathered, and harvesting of the later varieties of apples was in full progress at the end of the month.

After the storm on September 5 and 6 the supply of water was ample for all the needs of the project. Since September 24 the amount of water carried through the Gunnison Tunnel has been gradually decreased, until at the close of the month not over one-half of the water available in the river was carried.

Water was shut out of the Gunnison Tunnel on September 22 for 12 hours for inspection of the concrete lining of the tunnel and the South Canal.

The West Portal crushing plant was started up the fore part of the month and sufficient rock was crushed for the South Canal repair work which will be done this fall or next spring. The crushing plant was closed down for the season on September 30.

Ottumar Hamel, chief counsel, was a visitor on the project September 21 and 22. *Porter J. Preston.*

#### BOISE PROJECT, IDAHO.

The temperature during September was slightly above normal. There were a number of cloudy days. Light showers occurred at intervals. The total precipitation was 0.64 of an inch, which exceeded the normal by about 0.2 of an inch.

*Labor conditions.*—Labor was more plentiful during September than at any time during the present year. Full crews were maintained without much difficulty. The wage scale remained the same as during the previous month.

*Farming operations.*—Grain thrashing was practically completed and a large portion of this year's crop was shipped. The third cutting of alfalfa was under way during the latter part of the month but was delayed somewhat by light showers. Owing to unsatisfactory market conditions, few potatoes were harvested. Prune picking and packing was under way during the entire month. The portion of the crop picked so far has been shipped as fast as refrigerator cars could be obtained. The balance of the crop will go to the driers, which began operations the latter part of the month. A few cars of apples have been shipped but the major portion of the crop was yet to be picked. The hay market was very unsatisfactory; the greater part of the crop was still held by the farmers.

Community fairs were held at the various project towns during the month, where excellent displays of farm products and live stock were on exhibition. The State fair opened at Boise on September 27 with an unusually large display of farm products.

*Water supply.*—The flow of the Boise River during the month was about 21 per cent below the mean for the past 26 years. All the storage from Arrowrock Reservoir was exhausted and only a small amount remained in the Deer Flat Reservoir. There was sufficient water to mature all crops but pastures suffered to some extent on account of shortage of supply.

*Operation and maintenance.*—The Main Canal and distribution system was operated throughout the entire month with the exception of September 14 to 19, when the water was out of the Main Canal and lateral system above Deer Flat Reservoir. The supply of water was short, however, and only small heads were delivered for orchards, gardens, and late seeding. During the latter part of the month the maintenance work was begun with small crews on a portion of the distribution system.

*Construction.*—The lining of the Notus Canal was continued with Government forces. During the month contracts were awarded to F. A. Gould, of New Plymouth, Idaho, and Gus Carlson & Co., of Boise, Idaho, for the construction of the main Notus Canal on the north side of Boise River. The contractors began assembling their forces during the latter part of the month and expected to start construction early in October.

*Drainage.*—Drainage work was continued in the Big Bend and Riverside Irrigation Districts with the two dragline excavators each working two shifts. Machine No. 3 was employed on the project lands in Oregon above the Riverside Canal. Machine No. 4 continued operations under the Riverside Canal in Idaho.

*Surveys.*—Survey work for the month consisted of giving lines and grades for the drainage work in progress.

*Visitors.*—The chief engineer visited the project on September 26 to 28. —*J. B. Bond.*

## KING HILL PROJECT, IDAHO.

September weather was hot and dry, but favorable to growing crops and construction work.

At Camp 6 the McEachren concrete flume was 50 per cent completed. The trestle work for McEachren wood-stave flume was 50 per cent completed and the outlet structure completed. Wasteway No. 11 was 30 per cent completed.

At Camp 4 the excavation for Cassia siphon was completed and the form work almost completed.

Camp 10 was established for the construction of Tuanna siphon.

At Camp 4 the grading for the Head End flume was 40 per cent completed and the bending of reinforcing steel about 80 per cent completed.

Camp 7 was established for the construction of the remainder of the Four Mile flume, Wasteway No. 7, and the inlet and outlet of Big Pilgrim siphon. The wrecking of the old flume was completed and the grading work was 33 1/4 per cent completed.

Three engineering field parties were engaged on lines and grades.

The operation and maintenance forces of the King Hill Irrigation District maintained a successful delivery of water up to September 7, when the water was turned out of the canal.

Project Manager Barry Dibble of the Minidoka project visited the project on the 15th. *Walter Ward,*

## MINIDOKA PROJECT, IDAHO.

On the South Side pumping unit the delivery of water continued practically steady up to about September 20, when the demand began to fall off and at the end of the month the pumps were delivering about 230 second-feet. Three regular maintenance crews were engaged in cutting moss, weeds, and willows; repairing ditch banks, making minor repairs to structures, and cleaning laterals. At Jackson Lake the regular operation and maintenance work was carried on, some rock was placed in the rock fill on the north side below the dam, which has been sloughing off during the past two operation seasons.

At American Falls the field parties completed 90.5 miles of retracement of section lines. The contract for drilling test holes within the dam site was awarded, the work to start on or before October 11.

At a meeting held in American Falls on September 24 the following were chosen as an advisory board to represent the organizations contracting with the Reclamation Service for storage capacity in the American Falls Reservoir: William Sauer, Idaho Falls; H. A. Nielsen, Shelley, Idaho; J. D. Jensen, Blackfoot, Idaho; D. H. Blossom, Aberdeen, Idaho; Edgar W. Moorman, Twin Falls, Idaho; J. H. Barker, Buhl, Idaho; E. B. Brayton, Idaho Falls, Idaho.—*Barry Dibble.*

## HUNTLEY PROJECT, MONTANA.

Exceptionally fine weather prevailed throughout September. Practically no rainfall occurred during the month, greatly favoring the harvesting of crops. Labor conditions were satisfactory until the 20th, at which time beet harvesting was begun and practically all labor was used in this work. The first frost occurred on the 25th.

Supplemental construction work was the center of field activities during the month. This work consisted of replacement of timber structures in the first unit with permanent concrete turnouts and checks.

Operation and maintenance of the canal and lateral system were continued until the 25th, at which time

the water was turned out of the canal. Part of the operating force was furloughed, and necessary maintenance work continued with those retained. This consisted of repairing canal banks, enlarging laterals, clearing Pryor Creek channel of trees, brush, etc.

The harvesting of sugar beets progressed rapidly, and the yield is very good. A large amount of thrashing remained to be done, as this part of the harvest was retarded by lack of machines.

*Drainage.*—Back filling was continued with the Austin back filler on Drains 31, B and C. This work was completed on the 25th and the machine started for Drain 32, west of Ballantine. The main traction drive shaft broke while moving and the machine was laid up temporarily until a new shaft could be secured. Excavation and tile laying were begun on Drain 33 on the 17th; 700 feet of the drain was built when work was suspended owing to scarcity of labor. Investigations on the second unit were completed and sections plotted.

The town of Nibbe, located 1 mile east of Newton townsite, which was started during the summer, is growing rapidly. At present one mercantile store and a lumber yard are in operation and a large elevator is in course of construction. Other business opportunities are offered and an implement and hardware company is promised. Several residences have been constructed and others are contemplated. The new town is in the center of a large farming area and no doubt will become the distributing point for the dry-land district lying north of the Yellowstone River.

F. E. Weymouth, chief engineer, visited the project on the 11th. J. L. Savage, designing engineer, was on the project on September 22 looking over the proposed changes on the Main Canal between Osborn and Huntley. On the 29th, H. D. Comstock, project manager, Riverton project, visited the office and was interested in the class and condition of heavy lands prevailing on the Huntley project.—*Wm. M. Greene.*

## MILK RIVER PROJECT, MONTANA.

September weather was favorable for construction and operation and maintenance work. There was very little precipitation. The first killing frost occurred on the 28th. The cutting of the third crop of alfalfa was well under way at the end of the month. Blue-joint hay was practically all cut. Thrashing was well under way and grain crops in general were showing only a fair yield. The range was in good condition. Stock shipments were quite heavy, but these were mainly from the area tributary to the project.

The labor supply was entirely inadequate. Government forces, contractors, and farmers were all unable to secure labor in any appreciable quantities.

Very little water was delivered. No St. Mary water was supplied to the Chinook Division and delivery on the Malta and Glasgow Divisions amounted to only about 100 acre-feet. About 1,100 acre-feet were stored in Nelson Reservoir.

Construction by contract consisted of the completion of small earthwork contract No. 27. Two contracts for construction of lateral NS 116-2-10 were executed and work begun on one of them.

Construction by Government forces was practically at a standstill, all of the available labor being used on urgent maintenance work. A survey party was in the field throughout the month on lateral extensions. Bids were received on the 15th for 23,000 cubic yards and advertisement prepared to be opened on October 1 for about 37,000 cubic yards.



Maintenance work consisted of the cleaning of silt of about 4,200 feet of the Dodson North Canal by drag line, two shifts being operated throughout the month. A broken sluice gate at Vandalia Dam was repaired and the sluice and crest gates at this point were painted. At the end of the month work was in progress on the painting of crest gates at Dodson Dam. Other maintenance work consisted of minor repairs to structures, cleaning flumes for painting, and pulling willows on parts of the lateral system.

Official visitors for the month included F. E. Weymouth, chief engineer, from the 15th to 17th, Mrs. Della Raub, law clerk, on the 21st, and C. R. Trowbridge, inspector, of the Interior Department, from the 28th to 30th.—*H. A. Parker.*

#### ST. MARY STORAGE UNIT.

During September high winds were common and at Sherburne Lakes Dam there were frequent mountain storms. On a whole, the weather was unfavorable for the work being carried on. The St. Mary Canal and Sherburne Lakes Reservoir were not operated during the month.

Nearly all of the organization available was employed at Sherburne Lakes Dam, so that very little maintenance work was done on the St. Mary Canal, except for draining St. Mary Crossing and Halls Coulee pipes, opening wasteway structures, and digging out and puddling a few holes in the canal section.

Construction work at Sherburne Lakes Dam was continued, although results accomplished were not satisfactory, owing to extreme shortage of labor. The work at this point consisted of building dam embankment, paving the face of the dam, placing concrete cut-offs and foundations for the spillway flume, repairing the concrete in places in the spillway structure, building parapet wall on the top of the dam, excavating a spillway-approach channel, and screening and transporting gravel and sand.—*R. M. Snell.*

#### SUN RIVER PROJECT, MONTANA.

September weather was excellent.

A small force was employed throughout the month constructing dikes at Pishkun Reservoir. Labor has been very scarce and it has not been possible to secure more than about one-third of the force needed for this work. At the end of the month Camp 16 was opened for the completion of concrete lining in the Greenfields Canal at Big Coulee.

Irrigation water was delivered on the Fort Shaw Division until the 26th, but very little was used by the farmers. Water was run in the Greenfields Canal from the 1st to the 14th, inclusive, with a few deliveries for alfalfa irrigation.

Owing to the labor shortage no maintenance work was done. The office building and a cottage were moved from Camp 14 to Fairfield for use as residences by the operation forces. Fence building and repairs to the road in Willow Creek reserve were completed during the month.—*R. B. Williams.*

#### LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

September weather was favorable for the maturing of crops, harvesting, and maintenance work. The first killing frost of the season was on the 29th; the season had 127 growing days. The temperature and precipitation were about normal.

About 75 per cent of the grain crops had been thrashed and the harvesting of corn, sugar beets, and potatoes was well under way the last of the month.

The two drag-line excavators made satisfactory progress at removing silt from the Main Canal. The maintenance force, which has been materially reduced, was engaged at the routine work of repairing or replacing wooden structures and clearing laterals. The work of overhauling and repairing the telephone line from Intake to Ridgelawn was completed on the 20th.

The first annual Richland County fair was held at Sidney on September 7, 8, and 9. This fair was featured by the live-stock exhibits and the farm bureau community exhibits. About 200 head of live stock were shown, of which over one-half belonged to the Boys' and Girls' Calf and Pig Clubs. Some of the exhibits at the Richland County Fair were taken to the State fair at Helena, where the following prizes were taken:

First prize on muskmelons, navy beans, pumpkins, flax, sheaf grain, popcorn, Northwestern Dent, and White Flint.

Second prize on potatoes, cucumbers, onions, and Yellow Dent sheaf.

Richland County also won sweepstakes on Montana White Flint.—*L. H. Mitchell.*

#### NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

September weather was favorable for crop harvesting and for construction work. A light frost occurred on the 25th and the first killing frost on the 28th. The mean temperature was 0.5° above the normal for September.

*Operation.*—The inflow at the Pathfinder Reservoir continued larger than usual for September, the average inflow for the month being 623 second-feet. The outflow was reduced to 1,500 second-feet on the 17th and continued at that rate for the remainder of the month.

The diversion into the Interstate Canal was maintained at 1,500 second-feet until the 12th. After that date the demand for water for irrigation decreased and at the end of the month deliveries were discontinued. The diversion was governed by the amount of water in the river and a greater part was used for storage in Lakes Alice and Minatare.

The diversion into the Fort Laramie Canal varied between 300 and 750 second-feet, a greater part of which was wasted back to the river at the sand trap and wasteways. The demand for water gradually decreased and deliveries for irrigation were discontinued on the 30th.

*Maintenance.*—No difficulties were encountered in the operation of either the Fort Laramie or Interstate Canal systems. On the Interstate unit an average force of 44 men and 20 teams was employed on routine operation and maintenance work and replacing wooden lateral structures in the First and Second Lateral Districts with concrete. Work was started on the repairs to the paving on the upstream slope of the Minatare Dam. Monaghan dragline No. 4 continued work on the Interstate Canal banks, making between miles 34. and 35.2, operating with one shift daily. During the month this machine moved 10,250 cubic yards of material or an average of 410 cubic yards per shift.

*Crops.*—The third cutting of alfalfa has been harvested and good yields are reported. The potato harvest is about 40 per cent complete and the sugar-beet harvest has just begun. Little produce has been marketed. Some potatoes have been shipped, the average price received being \$1.25 per hundredweight. At the close of the month the price had dropped to 90 cents per hundredweight. There is apparently very little market for alfalfa hay.

**Live stock.**—There is little activity along live-stock lines as the old stock feeders seem undecided whether or not to feed on account of the numerous uncertainties in the stock and feed markets and the financial situation. The indications are that comparatively little stock will be fed.

**Drainage.**—Monighan dragline No. 2 continued work on the excavation of the Lower Nine Mile outlet drain. During the month 13,870 cubic yards of material were moved, or an average of 260 cubic yards per shift.

Dragline No. 3 continued work on the Dunham-Andrews drain, operating with two shifts daily, and excavating 11,590 cubic yards of material, or an average of 236 cubic yards per shift. The construction forces started work on a timber highway bridge over this drain and on the excavation for the concrete chute.

The Kelly Well Co. completed the drilling and casing of two drainage wells on the Dutch Flats area and made good progress on the third. The pump and motor for the first well were received and are being installed. The waste ditches for handling the water to be pumped were completed. Pumping operations will start early in October.

On the Fort Laramie unit electric dragline No. 2 continued work on the Cherry Creek drain for the first three days, after which the work was stopped to permit the substation to be moved and to make necessary repairs to the machine. During the working period 3,903 cubic yards of class 1 material were moved.

**Construction.**—On the interstate unit Adams & Ash made good progress on the contract for the construction of a four-room house at the Lake Minatare operation and maintenance camp, and at the end of the month the work was 75 per cent completed.

**Fort Laramie unit.**—Electric drag line No. 1 continued work on the excavation of the East Springer Lateral, operating with two shifts daily, excavating 28,300 cubic yards of class 1 material and completing 0.57 mile of lateral. Drag line No. 3 continued work on the excavation of the Fort Laramie Canal in Nebraska, crossing the line into Wyoming on the 23d. This machine was operated with two shifts daily and excavated 32,983 cubic yards of material, including 4,381 cubic yards of class 2, and completed 0.57 mile of canal. Drag line No. 5 completed the excavation for the Horse Creek Wasteway on the 11th, and after being overhauled resumed work on the Fort Laramie Canal east of Horse Creek on the 17th. During the month this machine moved a total of 23,670 cubic yards of material, including 2,500 cubic yards of class 2 and 500 cubic yards of class 3.

The powder crew, averaging 6 men and 1 team drilled 5,016 linear feet of holes and used 8,545 pounds of T. N. T. and 521 pounds of dynamite in loosening classified material on the Fort Laramie Canal.

The lateral structures on the lower end of the Cherry Creek system were completed. During the month concrete was placed in three drops, six farmers' turnouts, nine weirs, one check, one bridge, and the waste chute at the end of the lateral. Work was begun on the Lateral 35.4 siphon. The forms for the 23-inch concrete pipe were completed and the work started for the forms for the 30-inch pipe.

Good progress was made by the contractor, Roy Price, on the contract for excavation of lateral extensions in the First Lateral District, and at the end of the month the work was 95 per cent completed.

Bids were opened on the 10th for hauling approximately 240 cubic yards of gravel for structures on the Fort Laramie Canal and Main Springer Lateral. Seven bids were received and the contract was awarded to Wess Gletty, of Morrill, Nebr., at \$5 per cubic yard. Work was started on the 24th.

**Northport district.**—Work was continued by the elevating grader outfit operated by Government forces in the construction of fills on the Northport Canal. A total of 9,400 cubic yards of material was excavated, and the fills at stations 438, 445, and 574 were completed during the month. The team outfit also excavated the trench for the West Indian Creek siphon. During the month 1,974 linear feet of holes were drilled and 3,850 pounds of T. N. T. and 92 pounds of dynamite were used in loosening classified material on the Northport Canal.

The concrete work was completed on the culverts at stations 516, 574, and 594, and work started on the pipe culvert at station 260. One hundred and forty-seven loads of gravel were hauled to structure sites on the Northport Canal and the lateral system. Work was started on the forms for the West Indian Creek siphon.

The high-tension line from Bridgeport to the Indian Creek Camp for the excavation of the Northport Canal was completed and tested on the 25th. Electric drag line No. 4 was loaded at End-O-Line on the Fort Laramie unit and shipped to the Northport District and unloaded on the 12th. The drag line moved to station 613 on the Northport Canal and began excavating on the 29th.

Good progress was made on the two lateral earth-work contracts which were awarded in August. Bids were opened on September 10 and 24 for two schedules of lateral excavation, and contracts were awarded to L. R. Small, of Torrington, Wyo., and Wess Gletty, of Morrill, Nebr., for schedules No. 8 and No. 9, respectively, at 23½ and 24½ cents per cubic yard of class 1 material. Advertisements were issued for one additional schedule, the bids to be opened on October 4, 1920. Bids were opened for the excavation of 1,800 cubic yards from the West Indian Creek Siphon trench on the 21st, but all bids were rejected on account of the high unit prices bid.

**Power system.**—The Lingle power plant was operated continuously throughout the month with three shifts daily. Power was delivered to the city of Mitchell for the first time on September 8.

During the month 4½ miles of low-tension line were dismantled and 8 miles rebuilt. The substation for the Cherry Creek Drain was dismantled, moved, and rebuilt at the Box Elder Camp.

**General.**—Mr. A. P. Davis, director, was on the project from the 3d to 5th, inclusive, and Mr. Ottamar Hamale, chief counsel, on the 27th and 28th. Mr. A. W. Walker, drainage engineer of the Grand Valley project, was on the project from the 7th to 14th inspecting the drainage conditions and the work in progress. Mr. Herman Jansson, C. E., lieutenant in the Corps of Swedish Royal Engineers, Soderatljie, Sweden, and a member of the Swedish Royal Board of Waterfalls, Stockholm, Sweden, was on the project the 27th and 28th making a study of conditions and of construction methods and machinery.—*H. C. Stetson.*

#### NEWLANDS PROJECT, NEVADA.

On September 24 occurred the first frost of the 1920 growing season, which was of 144 days' duration.



The board of directors of the Truckee-Carson Irrigation District held numerous meetings and inspected project lands for the purpose of the adoption of rates for assessment of drainage benefits. At an important meeting held on September 29, assessment of benefits from proposed drainage work was adopted and will now go to the courts for ratification before actual construction can start.

Statistician C. J. Blanchard, accompanied by the official photographer, visited the project from September 9 to 13.

On September 11 Mr. Ferd Bonstedt, engineer, arrived from the Denver office to take charge of Spanish Springs Valley surveys, making an inspection of the proposed reservoir site September 13 and 14 in company with the project manager. Mr. Bonstedt left for Reno on the 16th to establish quarters for the immediate commencement of surveys.

On September 15 Chief Counsel Ottamar Hamel visited Lake Tahoe, coming to Fallon on the 16th for a few hours. The chief counsel and the project manager conferred with Gov. Boyle in Carson City on the 17th.

District Counsel Joseph N. Beardslee spent several days after September 16 in the Fallon office.

**Construction.**—Excavation of the Gault Lateral, station 51+05 to 157+76.4, by contract forces, was practically completed at the end of the month. This work, consisting of three schedules, involved the removal of about 16,489 cubic yards of class I material.

Monighan drag-line excavator No. 3 recommenced the improvement of the lower Truckee Canal bank, a length of approximately 850 feet of bank being reconstructed during September at two points where leakage has occurred near the Mason check structure.

The roofs of practically all of the buildings at the project shops and yards were painted.

Four minor timber structures, 2 culverts, and 2 turnouts were installed during the month in the lateral system.

**Settlement.**—No new water-right applications covering project lands were accepted during September. Numerous requests were received for farm units, which could not be filled owing to the fact that very few unentered farm units remain on the plats. It is planned to recommend the opening to entry of several thousand acres of new lands in the near future.

**Water supply and use.**—The surface of Lake Tahoe reached the very low elevation of 6,224.70 feet on the end of the month. The lake outlet gates were all open throughout the month in order to secure as great a flow as possible to satisfy vested power rates and irrigation from the Truckee River. At the end of the month it was possible to draw only 170 second-feet from this source. Outflow from Lahontan Reservoir varied from zero to 866 second-feet for irrigation requirements.

The Lahontan power plant was operated the entire month from the Truckee Canal, sufficient water also being available from this canal for irrigation needs.

**Operation and maintenance.**—The distribution system was operated during the month for the irrigation of approximately 47,000 acres. No breaks occurred in the canals or laterals.

All scheduled drag-line maintenance work was completed with the cleaning of the L Lateral, which was put in excellent condition throughout, a length of 8,024 feet being covered during September. Drag lines Nos. 2 and 4 were overhauled, repaired, and laid up for the season.

At the end of the month the greater portion of the maintenance work scheduled for this year had been

completed and most of the Government stock was placed in pasture.

The Carson Lake pasture was operated for the benefit of water users' stock, of which there were 1,502 head in pasture on September 30.—*John F. Richardson.*

*Project weather during September, 1920.*

Project.	Station.	Temperature.			Precipitation (inches).
		Maxi- mum.	Mini- mum.	Mean	
Salt River....	Phoenix, Ariz....	105	51	80.4	0.10
Yuma.....	Yuma, Ariz....	106	55	79.6	1.48
Orland.....	Orland, Calif....	101	44	70.5	T.
Grand Valley....	Grand Junction, Colo.	89	37	64.4	.98
Uncompahgre....	Montrose, Colo....	87	28	60	.86
Boise.....	Boise, Idaho....	92	40	63.2	.64
King Hill.....	Glenns Ferry, Idaho....	96	33	62.7	.20
Minidoka.....	Burley, Idaho....	89	33	57.2	.38
Huntley.....	Ballantine, Mont....	95	27	57.8	.35
Milk River.....	Malta, Mont....	91	24	58	.29
St. Mary storage....	Near Babb, Mont....	84	31	50	.25
Sun River.....	Fort Shaw, Mont....	87	28	57.6	.57
Lower Yellowstone....	Savage, Mont....	97	26	60.2	1.11
North Platte.....	Wyncote, Wyo....	92	24	58.8	.56
Newlands.....	Fallon, Nev....	93	28	62.2	.04
Carlsbad.....	Carlsbad, N. Mex....	97	47		.90
Rio Grande.....	El Paso, Tex....	92	53	75.1	.31
North Dakota pump- ing.	Williston, N. Dak....				
Umatilla.....	Hermiston, Oreg....	92	39	62	.88
Klamath.....	Klamath Falls, Oreg....	90	28	57.9	.17
Belle Fourche....	Orman, S. Dak....	94	25	63.7	.56
Strawberry Valley....	Provo, Utah....	88	32	60.4	1.47
Okanogan.....	Omak, Wash....	94	36	63.1	.86
Yakima.....					
Sunnyside unit....	Sunnyside, Wash....	94	36	52.2	.90
Tieton unit....	Cowiche, Wash....	86	40	58.6	.91
Riverton.....	Diversion dam camp, Wyo....	86	24	56	.93
Shoshone.....	Powell, Wyo....	88	32	59.2	.15
Indian projects:					
Blackfoot.....	Browning, Mont....	79	22	44.5	T.
Flathead.....	St. Ignatus, Mont....	90	31	56	.64
Fort Peck.....	Poplar, Mont....	94	24	59.7	1.54

CARLSBAD PROJECT, NEW MEXICO.

The weather has been fair and warm during September with the exception of a few cloudy days. The total run-off of the Pecos River for the month amounted to 7,140 acre-feet. The maximum flow was 232 second-feet on September 1 and the minimum flow 68 second-feet on September 27. The supply of labor for the project was normal. Considerable labor from outside sources reached the project during the latter part of the month in anticipation of the cotton-picking season.

**Construction.**—The regular foreman was employed for a few days building one concrete culvert over a new lateral. A number of wooden weirs with metal crests were constructed in the shop ready for installation later in the season.

**Operation and maintenance.**—With the exception of one-half day's work mowing the canal and a few days spent on laterals, no maintenance work was done during the month.

Crops generally were in very good condition at the end of the month. All alfalfa hay harvested was of an excellent grade, owing to good weather conditions. Cotton picking started in a small way about September 25. About 125 bales were ginned at the end of the month. The crop generally is rather late and is opening slowly. Shipments of alfalfa hay

were active, with prices ranging from \$18 to \$22 per ton. Thrashing of the alfalfa seed crop was in progress during the month. The average yield was better than for several years past.—*L. E. Foster.*

#### RIO GRANDE PROJECT, NEW MEXICO—TEXAS.

The weather was warm for the month of September and precipitation considerably below normal.

Inflow into the reservoir was very high, the total for the month being 7,859 acre-feet; 24,000 acre-feet were delivered to users. The large discharge from the reservoir was continued to raise the water high enough in the river to insure a supply for the Montoya unit.

A temporary wasteway was constructed from the Chamberino Canal to sluice and sand out of the canal. The only maintenance work performed was that which was absolutely necessary for operation.

Cotton is opening, and picking has begun. The first bale of cotton ginned in the El Paso Valley was grown by Bells and Ford and was sold at auction on Farm Bureau Day, bringing 62 cents per pound. The first bale ginned in the Mesilla Valley was grown by F. H. Riley and sold for 37 cents per pound. In addition Mr. Riley received about \$250 in premiums offered by the merchants at Las Cruces. A. M. Clark exhibited a cotton plant at the Dona Ana County fair which contained 430 forms.

The annual picnic of the El Paso Valley Farm Bureau was held at Clint, Tex., on September 16. Among the many interesting exhibits was a display of fancy work by the Woman's Club, attracting much attention. The speakers were T. D. Porcher, president of the El Paso County Water Improvement District, and Mr. Knox, manager of the Cotton Growers' Association of Salt River Valley.

The Dona Ana County Fair was held at Las Cruces from the 22d to the 25th of September. There was an excellent display of fruit, vegetables, and all farm products. Among the best were the fruit exhibits of Mr. Crops and Mr. Locke and the vegetable exhibit of Mr. Lee. The first, second, and third prizes for corn were awarded to school boys, which argues well for the instruction of the New Mexico Agricultural College. One of the finest exhibits was that of dairy cattle, under the management of Mr. Dan Kloss. Jersey, Holstein, and Guernsey cattle were entered.

Construction progressed on the project during September as follows: In the Rincon Valley the Monaghan 1-T dragline excavator moved 18,000 cubic yards on the Garfield Drain. In the Mesilla Valley two of the Bucyrus draglines began work on canals and laterals, while the 2-T Minoghan and the other Bucyrus machine continued drainage construction; 107,000 cubic yards were excavated from drains and 21,800 cubic yards from canals and laterals. Preparations were being made for the winter reconstruction program on laterals. In the El Paso Valley one Bucyrus dragline continued drainage, excavating 39,000 cubic yards on the Fabens Drain, and the other continued the construction of the Playa Lateral. At Elephant Butte preparations were begun for establishing a camp and construction plant for work on the spillway and embankment paving.

An election was held by the El Paso County Water Improvement District No. 1 on September 25, at which it was voted to take in the Tornillo District. Preparations are being made to let a contract for beginning drainage construction immediately, it being anticipated that funds will be temporarily advanced by the district.—*L. M. Lawson.*

#### NORTH DAKOTA PUMPING PROJECT.

September weather conditions were about normal. The first killing frost occurred September 29, which was exceptionally late and gave ample time for late crops to ripen, especially vegetable crops.

An unusual incident on the project was the sale of 5 tons of ripe tomatoes from one farm.

Labor conditions continued bad, and some fall maintenance work will necessarily be deferred until spring on that account. Harvest work required all the available men.

The power plant was operated for the commercial power operations with a normal increase over the same month of last year. Several new motor installations which will increase the load are being made.—*Wm. S. Arthur.*

#### UMATILLA PROJECT, OREGON.

September was marked by unusually heavy rainfall, the precipitation of 0.77 inch being exceeded only once in 12 years.

The harvesting of the third crop of alfalfa was interfered with by the abnormal rainfall and some discoloration of hay resulted. Seventy-nine cars of baled alfalfa hay, 4 cars of alfalfa meal, and 23,937 pounds of honey were shipped during the month. It has been a profitable season for beekeepers, Mr. George Parsons reporting a yield of 420 pounds of extracted honey from one colony.

With the decrease in farm operations, the labor necessary for the construction work now in progress has been obtained without difficulty.

A number of wells were sunk in the Boardman district in connection with the drainage investigations and regular measurements will be taken to secure data on ground-water movement.

Little maintenance work was done during the month. The feed canal was not operated and there was little demand for water. The flow of the Umatilla River was increased by the heavy rainfall and an abundant supply is available for the West Extension Canal. The irrigation season on the East Side closed on the 30th of the month and all water was cut out of canals except 14 second-feet in the Maxwell Canal and 5 second-feet in the "A" Canal for pipe manufacture and construction purposes.

On the 13th water was turned out of the lower portion of the "A" Canal and the running of lines and grades commenced. When on the 24th it became apparent that it would not be necessary to again turn water into this part of the canal, trimming of the banks for lining was started. The raising of the lining on the lower side of the canal, begun in August, was continued during the early part of the month, about 40 cubic yards of concrete being placed. A gravel pit was opened and delivery of sand and gravel begun, and arrangements are practically complete for starting concreting the early part of October.

The annual Umatilla Project Field Day was held at the Umatilla Experiment Farm on the 11th, with ideal weather and a record-breaking attendance, lunch being served at noon to over 1,000 people.

The Columbia Basin Alfalfa Growers' Association was organized at Boardman the latter part of the month, representing Morrow and Umatilla Counties, for the purpose of giving special attention to the growing, standardizing, and marketing of the alfalfa of the project. A selling contract is being developed for the marketing of the 1921 crop, the present crop to be sold in pools under the control of the board of directors.



Chief Counsel Ottomar Hamele visited the project on September 4, going over current legal matters and making a brief inspection of the project. On the 13th Mr. A. P. Davis, director, and Mr. H. L. Holgate, district counsel, arrived on the project for a conference with representatives of the water users' association and irrigation district in connection with the general contract for the East Side unit. After a brief inspection of the West Extension unit on the 14th they left for Portland. Mr. F. E. Weymouth, chief engineer, visited the project on the 22d, going over such engineering problems as required attention. Mr. W. O. Hadley, district game warden, was a visitor on the 29th and 30th.—*H. M. Schilling.*

*Summary of employees for September, 1920.*

Projects	Begin- ning of month.	End of month	In- crease.	De- crease.
Yuma.....	270	248		22
Orland.....	21	36	15	
Grand Valley.....	90	75		15
Uncompahgre.....	69	70	1	
Boise.....	205	188		17
Kling Hill.....	201	217	16	
Mimboka.....	120	110		10
Humbley.....	49	34		15
Milk River.....	49	47		2
St. Mary storage unit (including one-half time of 8 employees on Blackfeet).....	48	38		10
San River.....	42	36		6
Lower Yellowstone.....	30	31	1	
North Platte.....	489	407		82
Newlands.....	62	64	2	
Carlsbad.....	21	15		6
Rio Grande.....	415	377		38
North Dakota pumping.....	45	46	1	
Unatilla.....	32	50	18	
Klamath.....	35	55	20	
Belle Fourche.....	77	90	13	
Strawberry Valley.....	50	44		6
Okanogan.....	30	23		7
Salmon Lake-Okanogan.....	85	81		4
Yakima.....	244	187		57
Riverton.....	44	48	4	
Shoshone.....	129	165	36	
Denver office.....	71	77	6	
Blackfeet (including one-half time of 8 employees on St. Mary).....	13	25	12	
Flathead.....	190	120		70
Fort Peck.....	24	21		3
Field legal offices.....	25	25		
Washington office.....	94	94		
Unassigned per diem.....	35	35		
Examiners' force.....	3	2		1
Total employees.....	3,407	3,181		
Increase.....			145	
Decrease.....				371
Net decrease.....				226

KLAMATH PROJECT, OREGON-CALIFORNIA.

September was generally favorable for the growing of all crops. A light frost occurred on the 25th but did little damage except to gardens. The second cutting of alfalfa was completed on nearly all the farms, and the harvesting of the project grain crops will be completed early in October. On the Tule Lake leased lands three combined Holt harvesters were employed and a number of binders and headers. The grain crops on the Tule Lake lands were extremely heavy and all available harvesting equipment was being pressed into service.

The agricultural value of the reclaimed Tule Lake lands has been well advertised, as inquiries were

being received from distant points. About 12,000 acres were being offered for lease during 1921 for which bids will be opened on November 9. When the works necessary for the irrigation of the Tule Lake lands have been constructed, the lands will be available for settlement by soldiers.

The demand for water during the month was light, only 1,270 acre-feet being delivered to the farms. Water was turned out of the C Canal on September 6 and out of the remainder of the system on September 30.

On the C Canal about 3,000 feet of the old timber lining were removed and the canal is being prepared for concrete lining 3 inches thick. It is planned to line about 5,500 feet of the canal during October and November. The concrete mixer arrived on September 22 and the placing of concrete was begun on the 27th. From 25 to 40 men were being employed.

It has been extremely difficult to secure and maintain efficient labor for the concrete-lining job. It has been necessary on two occasions to send a man to Sacramento to secure laborers. The wages paid were \$5.50 per day for common laborers which is somewhat below the scale paid by local industrial concerns.

The Monaghan 1-yard dragline excavator was idle from the 7th to the 23d on account of a broken pinion gear. The machine constructed the No. 31 drain between stations 35+05 and 54+70, which required the excavation of 7,004 cubic yards of material, about 60 per cent of which was class 2.

One survey party, consisting of an assistant engineer and three men, was engaged on general work and in connection with the concrete lining of the C Canal.

The Klamath County Fair was held on the 23d and 24th of the month. The horses, cattle, sheep, and hogs exhibited were of a high order, much of the stock being registered. The display of farm products was very good. The great variety of the exhibits and the excellent quality were a surprise to most of the visitors.

C. J. Blanchard, statistician, and R. B. Dame, photographer, were on the project from the 13th to the 19th, and secured a large number of still and moving pictures showing the agricultural and industrial development of this section. Ottomar Hamele, chief counsel, visited the project on the 9th, and E. W. Burr, district counsel, was here on the 26th to 29th.—*Herbert D. Newell.*

BELLE FOURCHE PROJECT, SOUTH DAKOTA.

September weather was very favorable for the maturing and harvesting of crops. Precipitation was almost negligible and the thrashing of grain made rapid progress. A heavy frost occurred on the 26th that killed all garden truck and prevented the complete ripening of late planted corn. The area of corn damaged, however, is not large.

The third cutting of alfalfa was being harvested at the close of the month and showed a very light yield. Returns on alfalfa land for the season will be unsatisfactory, as the first cutting was badly damaged by rain and the last cutting was light. The seed crop is almost a complete failure, and in most cases will not pay expenses.

Small grains are yielding poorly owing to heavy damage from rust. Few fields will pay expenses of cultivation and harvest.

Beets promise a fair return, and will make an average yield of perhaps 9 to 10 tons per acre.

Shipments of hogs during the month were heavy and the price was good, ranging from 12 to 14 cents, locally, for both fat and feeder hogs.

Water was turned out of the canals on the evening of the 18th and the irrigation season closed about two weeks early in order to permit small laterals to dry out in time for cleaning before freezing weather.

Maintenance work was carried on from the three district stations, Orman, Newell, and Vale, with such crews as could be organized. Good progress was made on repairing the drop in the Inlet Canal, and this work, outside of setting the gates which will not arrive until near the close of the year, will be completed by October 15.

Work was resumed on the Townsite Lateral Siphon and is progressing satisfactorily. In the Vale district, where canals are in sandy soil, several ditches were cleaned during the last decade of the month. One concrete chute, replacing an old wooden flume about 500 feet long, was built and a number of minor structures were renewed.

Single-handed men were very scarce, but drivers with teams were plentiful. With dry weather during October it is hoped to accomplish much in the way of cleaning small laterals.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

September was generally fair with intermittent showers.

*Farming operations.*—Harvesting of all crops was nearly completed with the exception of the apple, potato, and sugar-beet crops. Harvesting of sugar beets has begun and fall plowing started. Crop yields for the past season have been excellent, with good prices prevailing.

On the last day of the month the High Line Canal was carrying 124 second-feet of water and during the month 6,674 acre-feet were delivered to the High Line unit for irrigation purposes. On the last day of the month the Spanish Fork River was flowing 80 second-feet, and during the month 5,808 acre-feet were furnished to the five Spanish Fork canal companies. The Mapleton and Springville irrigation districts called for 1,573 acre-feet. The total amount of water delivered during September to all units under the project was 14,055 acre-feet, and the total water delivered during the irrigation season is 67,369 acre-feet, of which amount 5,949 acre-feet is water from Spanish Fork River.

*Labor conditions.*—The scarcity of common labor and teams is marked. This is primarily due to the harvesting of the beet crop which is now going on, and also to the great amount of road work being done in the county. Skilled labor, however, has been ample and no trouble experienced in obtaining it when desired.

*Operation and maintenance, storage system.*—Operations at the west portal at Strawberry Tunnel continued throughout the month and consisted mainly of camp betterments and quarrying rock for the crushing plant. Work has been somewhat retarded on account of the scarcity of common labor and teams. During the month approximately 100 tons of supplies were hauled in by trucks.

*Operation and maintenance, power system.*—The power plant was operated without serious interruption throughout the month and power furnished to the towns of Spanish Fork, Salem, Payson, and Springville. Repairs to the exciter units are being contemplated and drawings covering the alterations are being prepared in the Denver office.

The telephone and transmission lines were operated without trouble throughout the month.

*Settlement.*—During the month only two supplemental water applications were accepted.

*General.*—The organization of the Santaquin Irrigation District is under way and the petition sent by the governor to the Utah County commissioners for their action.

Agreement was reached between the Strawberry High Line Canal Co. and the Strawberry Grazing Co. on September 25 relative to the terms of the lease of the grazing lands in the Strawberry Valley.  
—*W. L. Whittemore.*

#### OKANOGAN PROJECT, WASHINGTON.

The first half of September remained hot and dry, but from the middle of the month until the end, cooler weather prevailed with some rain.

Water was run continuously for irrigation during the month and the water supply available was that being furnished from the various pumping plants. A little help in the matter of water was had from Sahuon Creek during the latter part of the month. All of the emergency pumping plants were operated as continuously as possible during the month. The two pumps at Riverside were closed down on September 14, the one pumping from the well at Spring Coulee was closed on September 20, and the two pumping from wells on the upper main lateral on September 25. All the rest of the units were operating at the end of the month and will continue to be operated for approximately 10 days during the month of October.

At the end of the month, the apple harvest had begun and early apples were being picked and packed either at the large warehouses or at home and were being hauled to the railroad for shipping. The crop will be light and prices are not as high as for 1919; however, a good profit will be made where the crops are an average yield.—*Calvin Casteel.*

#### STORAGE UNIT.

Weather conditions during September were favorable for construction work. Most of the crews lost one and one-half days on account of rains.

Although labor is not available locally in sufficient quantity, full crew can be maintained by shipment from near-by cities.

A steam shovel was worked on the Salmon Lake road two shifts per day from September 1 to 13 and one shift per day for the balance of the month; 1,191 cubic yards of class 1, 6,152 cubic yards of class 2, and 2,432 cubic yards of class 3 material were excavated. At the end of the month this shovel was being moved back to the westerly end of the road to resume work on the Salmon Lake Dam.

A small team crew was employed placing impervious earth material around the gate tower in the Salmon Lake Dam. Only 3,841 cubic yards were placed, as the haul for suitable material was 3,500 feet; 545 cubic yards of riprap were placed on the upstream face of dam.—*L. V. Branch.*

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for September was below normal, with precipitation in excess of the average for the past 10 years.

*Operation and maintenance—Sunnyside unit.*—Operation of the Sunnyside irrigation system was continuous, the diversion being gradually reduced from



1,100 second-feet at the beginning of the month to 675 second-feet at the close, this reduction being due to the dropping off in demand for water on account of maturing of crops, cool weather, and frequent rain. The total area irrigated was 92,000 acres, and the total amount of water delivered to this acreage was 34,945 acre-feet. Water deliveries to the irrigation districts averaged as follows:

	Second-feet.
Outlook Irrigation District.....	40
Snipes Mountain Irrigation District.....	16.7
Grandview Irrigation District.....	32
Prosser Irrigation District.....	16.5
Sunnyside Irrigation District.....	39.2

Two maintenance crews (10 men and two trucks) were occupied in reconstruction of turnouts from the Mabton and Snipes canals. Two smaller crews (6 men and a team) were employed on grubbing willows and clearing weeds on the Main Canal, also repairing pipe lines, etc.

*Tieton unit.*—The Main Canal was operated at its maximum capacity of 311 second-feet up to the 15th, after which it was gradually reduced to 120 second-feet. Water was turned out for the season on the 30th. The average diversion for the month was 250 second-feet. Storage from Clear Creek Reservoir was released to supplement the flow of the river, 2,400 acre-feet remaining in this reservoir on the 25th. Water service was continuous and good regulation of flow was maintained in all laterals. Maintenance work was confined to the repair of small pipe lines, measuring boxes, and other minor structures. Preparations were in progress toward the close of the month for the fall program of rebuilding the transition at North Fork tunnel and plaster lining the floors of both Tieton and North Fork tunnels.

An exhibit of agricultural products from the Tieton unit at the annual State fair, held in Yakima September 20 to 25, attracted a great deal of attention and considerable favorable comment, a premium being awarded for quality and variety of the products as well as for arrangement of the exhibit.

*Investigations and surveys for new units.*—Work was continued on estimates and plans for the Moxee unit, under contract with the Yakima Irrigation District, and good progress made. In connection with the Roza unit, studies were made of the situation in the Yakima Canyon where the State highway and Roza Canal location conflict, and profile and cross sections prepared showing relative location of each, in order that the matter may be taken up with the State highway department for adjustment. Preparations were made for putting a field party at work, beginning October 4, on surveys for Roza unit, under contract with the Yakima-Benton Irrigation District.

*Cooperative investigations, Pasco project.*—Field work in connection with these investigations was practically completed and work begun on the compilation of water record data and soil survey maps. On September 12 Director A. P. Davis and Hon. J. W. Summers, in company with the project manager, visited the project.

*Storage unit.*—An average force of 55 men was employed at Lake Keechelus hauling and piling logs in the reservoir area. This work was interfered with to a considerable extent by frequent rainfall. The work of cleaning out the outlet channel was completed about September 10. One carload of horses used on the clearing work was shipped from Keechelus to Naches on September 24, to be transferred to the ranch at Rimrock for the winter.

*Cle Elum Reservoir.*—An inspection was made of the crib dam, and it was found that repairs would need to be made by filling in below the apron with rock and concrete blocks. It is planned to do this work during October. Timber cutting by the contractor (Cle Elum Lumber Co.) has been slow.

*Tieton Reservoir.*—The Northern Pacific Lumber Co. discontinued operation of the sawmill, and contract was executed by the company on September 28 providing for cancellation of contract of May 3, 1920.

*Visitors.*—F. E. Weymouth, chief engineer, visited the project on September 21, and H. L. Holgate, district counsel, and his assistant, Mr. Tyree, on September 27 and 28.—*J. L. Lytel.*

#### RIVERTON PROJECT, WYOMING.

The temperature during September was a little warmer than normal, the first severe frost occurring on the 23d. There were one or two showers early in the month which put the roads in poor condition for a short time.

Dragline No. 1 was operated two shifts throughout the month. Dragline No. 2 was operated one shift throughout the month, except 8 days when it was shut down for repairs. The total amount of excavation moved during September was 24,957 cubic yards, of which 800 cubic yards were excavated from outside the canal prism. Of the total excavation 23,292 cubic yards were class 1 material, being a heavy gravel, and 1,665 cubic yards were class 2 material, which was a sandy shale and which was moved without blasting. Dragline No. 1 is now working on the second cut and is excavating to canal grade.

The construction of a telephone line from Riverton to the Diversion Dam was in progress throughout the month. About 28 miles had been completed at the end of the month.

Work was continued throughout the month on the construction of a 4-room cottage at Riverton and of a similar gatekeeper's cottage at the Diversion Dam.

Two trucks continued hauling material and supplies to camp throughout the month.

The director and the chief engineer visited the project from September 6 to 8. The designing engineer visited the project from September 23 to 26. The project manager was absent at the end of the month, visiting the Huntley and Shoshone projects.—*H. D. Comstock.*

#### SHOSHONE PROJECT, WYOMING.

September was a normal month with moderate temperatures and pleasant weather. On the 25th there was a frost which damaged tender vegetation but did no injury except to gardens.

*Water supply.*—The water elevation in Shoshone Reservoir dropped slowly during the month. One of the balanced valves was in operation the entire time. The stream flow was not sufficient for water users and storage was drawn from.

*Operation and maintenance.*—The canal system was operated the entire month, but water will be shut out October 1. Twenty-nine thousand nine hundred and ninety-four acre-feet were diverted from the river at Corbett Dam; 14,497 acre-feet were delivered to about 600 farms in 1,273 deliveries for the irrigation of about 31,000 acres. Maintenance work consisted mainly of miscellaneous minor structure repairs, cutting of sweet clover along the banks of some of the ditches, a small amount of lateral cleaning, and the repair of a break in closed drain A.

**Crops.**—The harvesting of crops was actively under way. Small grains had practically all been harvested. The digging of potatoes began on the 20th and sugar beets on the 22d. At the close of the month the former crop was about 40 per cent harvested and the latter 20 per cent. The third cutting of alfalfa was under way in some of the earlier fields, with a rather light yield. The potato and beet yields will be average. The alfalfa mill at Powell contracted some hay during the first of the month at \$12 per ton, but at the close of the month it dropped the price to \$10 per ton delivered at the mill. Grinding will begin the 4th. A large amount of wheat and potatoes has already been shipped from the project.

**Labor.**—Considerable labor was imported into the valley during the month and the farmers are suffering no severe shortage in this respect. The supply for the Reclamation Service is inadequate, \$5 per day being offered.

**Drainage.**—On the Garland Division the Lidgerwood dragline completed the excavation of open drain X and began the excavation of open drain X-92, excavating 2,370 linear feet during the month. The Monighan dragline continued on the upper end of open drain 28, excavating 1,365 linear feet. The Bucyrus dragline No. 5, transferred from the Rio Grande project, was set up and moved to the lower end of open drain 28, of which it excavated 1,340 linear feet. The Austin trencher did no work during the month because of lack of tile. On the Frannie Division the Bucyrus dragline did a small amount of ditch cleaning in seeped ground and then moved into open drain 102 west of Deaver town site, excavating 1,290 linear feet.

**Field and office engineering.**—Field work was carried on by one survey crew each on the Frannie and Garland divisions, mostly in connection with construction and drainage operations. Some topography was taken at Shoshone Dam for use in connection with the study of the hydroelectric power development contemplated at that point. A board of engineers sat at Powell on plans for the Willwood diversion and canal system and some office work was done in connection with the board work. Other office work was of a routine nature.

**Settlement.**—One vacant farm unit was entered during the month.

**Construction.**—On the Frannie division Government forces worked on a small system for the recapture of waste water on the first unit on the construction of the Frannie Canal Flume across Sage Creek siphon at station 2010, storm-water culverts and lateral and farm turnouts on the third unit of the division, and a small amount of channel rectification on Sage Creek in the vicinity of Cowley station. The contractors on the lateral system for the third unit of the Frannie division continued work during the month, moving 7,500 cubic yards of material.—*J. S. Longwell.*

#### INDIAN PROJECTS.

##### BLACKFEET PROJECT, MONTANA.

September weather was about normal except that there was scarcely any precipitation. High winds were common but did not interfere seriously with the work of the service, and only about as usual with the farming operations.

Construction work carried on consisted of the enlargement of the Two Medicine Canal with a dragline excavator, and the placing of a few minor structures on the Fisher Flats lateral system.

Only two systems of the project were operated and these for only a part of the month, a total of 28 second-feet being delivered to farms.

A small amount of maintenance work was done on the Two Medicine Canal, Four Horns Supply Canal, Fisher Canal, and the Fisher Flats distributing system. Most of the harvesting on the project was completed at the end of the month and a considerable portion of the thrashing done. Owing to the fact that a killing frost did not occur until the 28th, most all of the crops matured. Crop returns on a whole were very satisfactory. *R. M. Snell.*

##### FLATHEAD PROJECT, MONTANA.

During September 17,128 cubic yards of material were placed in Dry Fork Dam. Outlet works were begun and 111 cubic yards of concrete placed; 512 cubic yards were excavated from the spillway and 67 cubic yards of riprap were placed on the upstream face of the dam.

Excavation of the Pablo Feeder Canal was continued, with a total yardage for the month of 18,231, and Ashley Creek wasteway was completed.

On the Mission A lateral system the 21 A flume was completed and also six minor structures.

All construction was done by Government forces.

The number of acres irrigated was about 1,800, with about 2,000 acre-feet of water delivered.

The condition of the crops and live stock is good. *N. B. Hunt.*

##### FORT PECK PROJECT, MONTANA.

The weather during September was cool, with more than normal precipitation. The first killing frost occurred on September 29. All available labor was employed by the farming interests and railroads.

Construction work was carried on at the Big Muddy unit in the construction of checks, turnouts, and bridges, and the manufacturing of lock-joint pipes. This work was held back on account of the shortage of labor.

Water was delivered under the Poplar River unit during the first part of the month. No water was delivered under the Little Porcupine or Big Porcupine units. Maintenance work was done on the last two units in cleaning canals and raising the banks of laterals.

By the end of September thrashing was practically over, and good progress was being made in fall plowing.—*R. M. Conner.*

#### GENERAL OFFICES.

**Washington office.**—Director Davis was in the field during September, returning to the office on September 30. He visited a number of the projects, delivered several addresses at meetings of branches of the American Society of Civil Engineers, of which he is president, and acted as consulting engineer for the city of Seattle on the proposed Skagit River power development. During his absence the office was in charge of Morris Bien as acting director.

Chief Counsel Hamele was in the field during the month, returning on October 2.

J. M. Luney, chief clerk of the Denver office, has been in the Washington office since September 8 in connection with the estimates of appropriations.

On September 19 A. H. Gullickson, chief accountant, left for a field trip, Mr. Luney and Mr. Lyman acting as chief accountant in his absence.



On September 29 H. T. Cory returned from Egypt, where he has been during the past several months serving on a commission in connection with the adjudication of the waters of the Nile. On September 30 he gave a short talk to the employees of the Washington office on his work in Egypt, and on October 6 gave an illustrated lecture on the same subject before the Washington Society of Engineers.

Chief Counsel Hamele returned to the office on October 2.

Galley proof of the nineteenth annual report was received from the printer during the month, and portions relating to each project were sent to the field for final review and correction.

During the month 977 inquiries from ex-service men concerning opportunities on the land were received and answered. Up to the end of the month over 175,500 such inquiries had been received.

Among the visitors during the month were L. K. Chase, of the Los Angeles Chamber of Commerce, and Kaj Dessau, horticultural expert, Copenhagen, Denmark.

The consolidated balance sheet shows the net investment of the United States to August 31, 1920, is \$120,965,225.43. The actual net investment of projects other than the Yuma auxiliary is \$121,278,233.73. In the case of the Yuma project the situation is the reverse of that on the other projects, in that the returns are received before any expenditures are made. The receipts are in excess of the disbursements by \$313,008.30.

At the end of September there was on hand in the Treasury and with special fiscal agents the sum of \$2,008,235.92. Under an arrangement with the Treasury Department, the \$20,000,000 loan is to be repaid to the general Treasury in installments of \$100,000 monthly by deducting this amount from the land office receipts, the total in any one year not to exceed \$1,000,000.

*Fund transactions, United States Reclamation Service, taken from Washington office books for the month of September, 1920.*

Treasury balance, Aug. 31 report.....	\$1,578,355.04
From:	
Net <sup>1</sup> public-land sales.....	111,526.73
Town-site lot sales.....	19,076.98
Potassium royalties and rentals.....	6,560.41
Deposits by fiscal agents.....	157,817.99
Collected by auditor.....	4,481.63
Increased compensation advanced.....	84,300.00
Total credits.....	2,262,118.78
Withdrawals:	
Requisitions for advance, reclamation fund.....	483,500.00
Requisitions for advance, increased compensation.....	84,300.00
Auditors' settlements.....	54,048.73
Total withdrawals.....	621,848.73
Balance.....	1,640,270.05
Balance with special fiscal agents.....	367,965.87
Subtotal.....	2,008,235.92
Estimated Newell town-site sales in excess of \$15,000.....	4,500.00
Net <sup>1</sup> land sales for August available in October.....	110,858.18
Estimated net <sup>1</sup> land sales for September.....	60,000.00
Total.....	2,183,594.10

<sup>1</sup> Net means after monthly deduction of \$100,000 is made to repay on bond loan which, taking the above into consideration, amounts to \$19,700,000. Balance in Treasury available for expenditures Oct. 12, 1920, \$1,297,482.86.

*Denver office.*—The chief engineer left on September 5 for a trip to the field and during the month visited the Riverton, Shoshone, Huntley, Sun River, Milk River, Flathead, Yakima, Umatilla, Powder River, Boise, and American Falls projects. Assistant Chief Engineer R. F. Walter was in the Denver office during the entire month. Assistant Chief Engineer Chas. P. Williams left on September 3 and visited the Sun River and Shoshone projects, returning on September 21. Official visitors included Director A. P. Davis, Messrs. A. Weiss and F. A. Banks, and Chief Counsel Ottamar Hamele. Other visitors were Carlos A. Volpi, an engineer from Argentine, and Herman Jansson, lieutenant in the Corps of Swedish Royal Engineers.—*F. E. Weymouth.*

### LARS M. RASMUSSEN, 1880-1920.

Lars M. Rasmussen, employed by the United States Reclamation Service, 1913 to 1920, died at his home near Zillah, Wash., early Sunday morning, September 12, 1920, after a short illness of pneumonia.

Mr. Rasmussen was born in Oregon, Wis., in 1880. He was engaged in farming near Rutland in his native State until 1912, at which time he removed to the Northwest, settling on a farm near Zillah.

From 1913 to the summer of 1917, Mr. Rasmussen worked for the Reclamation Service in various capacities, having been employed as a ditch rider on the Sunnyside Main Canal since July 11, 1917. He was very conscientious and efficient, not only in the performance of his regular duties as ditch rider, but was considered one of our best foremen during the maintenance season. His treatment of his associates was uniformly courteous and agreeable, and all with whom he came in contact felt the influence of his pleasing personality.

Mr. Rasmussen leaves a wife and three children and a host of friends who deeply mourn his loss.

### SPANISH EDITION OF THE RECLAMATION RECORD REQUESTED.

A number of the water users on our reclamation projects in the Southwest have requested us to issue a Spanish edition of the RECLAMATION RECORD. The expense involved in issuing a separate edition of the RECORD in the Spanish language would be so great as to preclude the possibility of doing so.

Our suggestion is that these water users continue to improve themselves in their knowledge of the English language in order that they may avail themselves fully of the store of valuable information contained in the pages of this publication.

One secret of success in drying fruits and vegetables is to avoid too long heating and too high temperatures.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

Hon. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSANG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk and Superintendent of Buildings.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamele, chief counsel; J. B. Beadle, director's assistant; C. J. Blanchard, statistician; Hugh A. Brown, editor; E. C. Bebb, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk; F. G. Hough, Yakima, Wash., and C. E. Platt, Denver, Colo., examiners of accounts.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD LEGAL OFFICES.

**Boise, Idaho.** B. E. Stantenmyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement; R. M. Patrick, district counsel located at Burley, Idaho.

**Denver, Colo.**—Law section office of chief engineer; E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.** W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—J. N. Beardslee, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—E. W. Burr and Henry A. Cox, district counsel, 349 Pacific Building. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; R. C. Walber, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinlauf, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Balfantine, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

**Lower Yellowstone Project.**—I. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. T. M. Culbertson, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer; E. C. Diehl, chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melaas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Ferrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent; L. V. Branch, engineer, Condon, Wash.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—I. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk; J. C. Thraillkill, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; C. C. Cragin, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; R. L. Morgenweck, chief clerk; L. H. Kline, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, acting project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—P. J. Preston, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crowover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Scheppelmann, chief clerk; E. M. Philebaum, fiscal agent.

## INDIAN PROJECTS.

**Blackfeet Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk and fiscal agent.

**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; H. N. Bickel, chief clerk; J. P. Siebeneicher and J. M. Swan, fiscal agents.

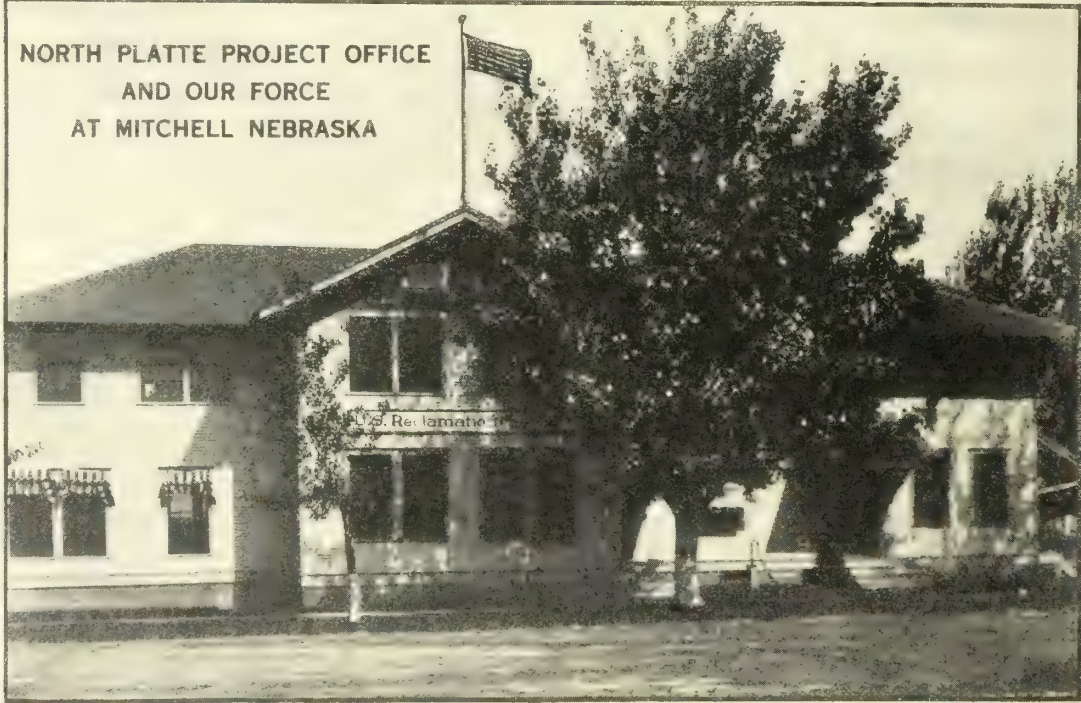
**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

WORK AND SAVE. BUY GOVERNMENT SECURITIES.





**NORTH PLATTE PROJECT OFFICE  
AND OUR FORCE  
AT MITCHELL NEBRASKA**



From left to right, standing: L. H. Hawkins, chief stenographer; W. I. Tingley, purchasing agent; L. H. Mong, drainage timekeeper; I. J. Matthews, project costkeeper; Henry A. Cox, district counsel; A. M. Easterday, assistant engineer; Andrew Weiss, project manager; E. E. McDonald, draftsman; H. F. Parsons, drainage engineer; Harry Hillje, stenographer; George E. Larson, general foreman; Harry Seger, assistant costkeeper; E. A. Peek, bookkeeper; J. R. Ummel, chief clerk; Paul Roth, irrigation manager; H. C. Stetson, office engineer; H. W. Bashore, assistant project manager; Mayne Allmon, rodman; N. G. Wheeler, assistant chief clerk; Roy Morrison, property clerk; A. T. Stimpfig, personnel clerk; W. H. Fisher, assistant engineer; Ralph Morris, chief of party; W. J. Chiesman, clerk, water users' accounts. Sitting: W. R. Curtis, storekeeper; Lillie Ferguson, clerk to district counsel; Ruth Russell, messenger; Faye Elder, stenographer; Gertrude Jirton, stenographer; Opal Bowen, stenographer; Catherine Keltch, stenographer; Jennie Hawkins, telephone operator; Alma L. Perrine, special fiscal agent; Elsie Smith, mail and file clerk; Harry Sommers, janitor.

(NOTE.—The above group represents project office employees and other employees of the Reclamation Service having headquarters at Mitchell, Nebr.



# Reclamation Record

ISSUED MONTHLY BY THE RECLAMATION SERVICE  
DEPARTMENT OF THE INTERIOR, WASHINGTON, D. C.

**Better Business : Better Farming : Better Living**

THERE CAN BE NO SURER INSURANCE FOR THE NATION THAN TO PUT ITS MEN UPON THE SOIL.

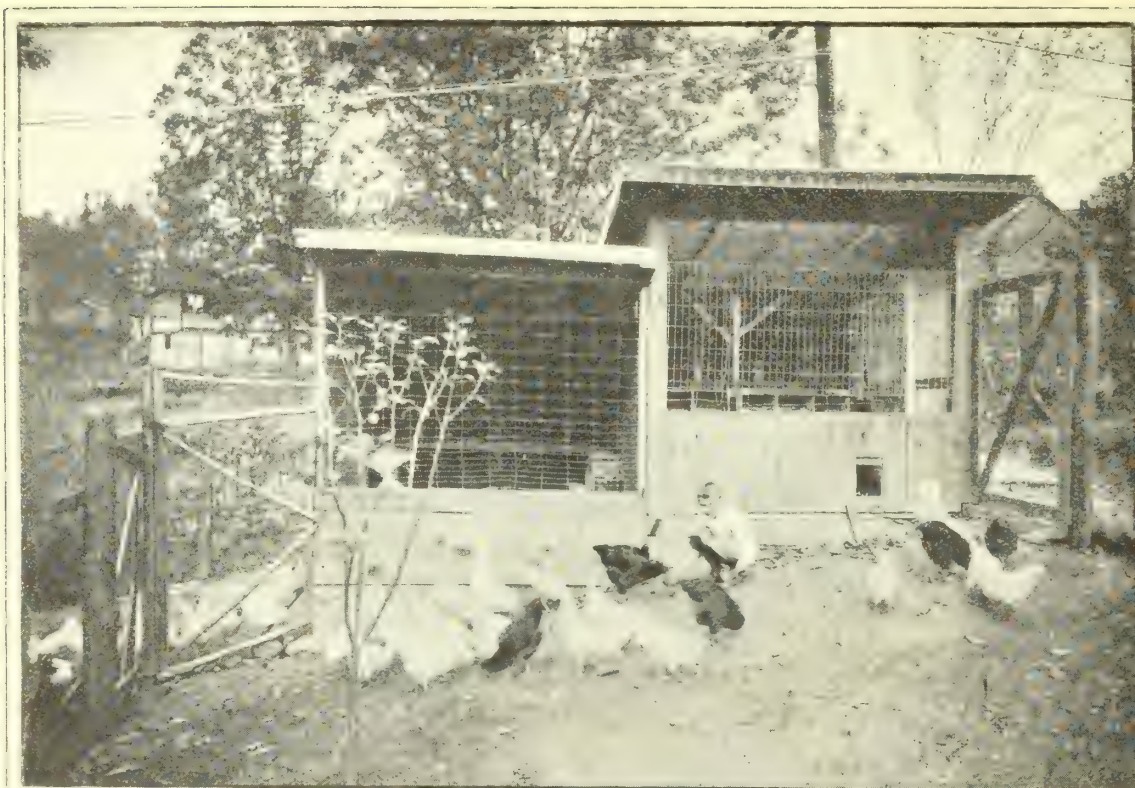
VOLUME 11, No. 12

PRICE {FREE TO OUR WATER USERS.  
FIFTY CENTS A YEAR TO OTHERS.

DECEMBER, 1920







## LET THE HEN HELP YOU CUT THE H. C. I.

By Mary R. Reynolds, U. S. Department of Agriculture.

**"A** FLOCK on every farm" should be the slogan to-day in the irrigated regions of the West, as it should be in other parts of the country as well. No domestic animal is more adaptable to varying conditions than the useful hen, and no other gives a better return for the money and work expended on it. During the war and since, the Government has tried to encourage more families to raise their own supply of eggs and chicken meat. In every instance where proper care has been given the flock, the results have been gratifying.

### WOMAN MAKES SUCCESS OF POULTRY.

Thousands of women in poultry clubs all over the country are making money with poultry besides having fresh eggs and chickens to use. One such is Mrs. Mary Pettieger, of Major County, Okla. She set 2,500 eggs last year and sold 1,015 baby chicks. She also disposed of 200 pullets for breeding purposes, and during the year sold 2,313 dozen eggs on the market and 700 dozen eggs for hatching. Some of the feed for the flock was raised by their owner, but the rest was bought. Besides buying a \$175 incubator, which holds 600 eggs, and a \$23 brooder, Mrs. Pettieger received a net return of \$1,043.80 from her flock in the year ending in November.

### BEST BIRDS TO SELECT.

Every general farm can support a flock of at least 100 birds. Success with the farm poultry flock depends on the observance of the fundamentals of successful poultry keeping, and this means doing a relatively few things in the right way and doing them at the right time.

Where the poultry flock is expected to furnish eggs and poultry for the table, it has been found that the so-called general-purpose breeds are usually best suited for the purpose. The general-purpose breeds include the Plymouth Rock, Wyandotte, Rhode Island Red, and Orpington, which are good layers, and at the same time make suitable carcasses for the table.

The selection of breeding stock is important. On most farm flocks no trap nesting or leg banding is possible on account of the time and labor involved. But if careful attention is given to the selection of breeders, advances may be made.

In every flock a great difference will be found in the productivity or egg-laying ability of the various individuals. Some hens will prove to be very profitable, whereas others are kept at a loss and are a drag on the profitable hens in the flock. Where eggs are not to be used for hatching, keeping of male birds is not necessary. The fact that there is no male bird

in the flock will have absolutely no effect on the number of eggs laid by the hens. If it is desired to mate the hens and hatch chicks, the male bird should be disposed of just as soon as the hatching season is over. This is desirable not only to eliminate noise, but also to save the feed the male would eat, and to produce infertile eggs which keep much better than the fertile ones and consequently are superior for preserving and for market.

### HOW CULLING IMPROVES THE FLOCK.

If a profit is to be realized from the flock as a whole, it is also important to cull out the unprofitable hens. This will increase materially the profit realized from the flock as a whole. Any hens found to be sickly or in poor condition should be culled as soon as discovered. In addition, at least one thorough culling should be made annually, preferably between August 15 and September 15. At that time each hen should be handled and carefully examined and those which show evidences of laying should be retained while those which have stopped laying and begun to moult should be discarded from the flock for the following year. A further examination of the hens late in October or early in November will enable one to pick out those which are still laying and by virtue of that fact are probably the best layers of the flock. The United States Department of Agriculture has issued directions on how to cull a flock in Farmers' Bulletin 1112.

### HOUSING THE FLOCK COMFORTABLY.

The size of the flock has a direct connection with the housing which can be provided. It is not an infrequent occurrence for an effort to be made to keep a number which is much too large for the available housing space. In such spaces the hens, being crowded, do not give good results, and frequently a better profit would be realized by keeping a smaller flock which can be comfortably housed rather than the larger flock which results in crowding.

Suitable housing for the poultry flock does not mean expensive housing. Frequently old sheds or other outbuildings can be utilized for the purpose. The transformation can be made easily and cheaply. There may be a great range in the kind of house used and the owner may consult his own preferences to a considerable extent, but there are certain fundamentals of good housing which must be observed. These consist of a house which is free from drafts, which provides plenty of ventilation either by an open front or by the use of windows, which is dry, and which provides space enough for the hens to keep them com-



fortable and contented. Where it is necessary to confine the flock to the yard not less than 4 square feet of floor space should be allowed for each hen. With hens on free range, as they should be whenever possible, a minimum floor space of 3 square feet per hen should be allowed.

#### GOOD FEEDING AT MODERATE COST.

Giving the farm flock the right kind of feed is important. If hens do not get sufficient or proper feed they can not be expected to give satisfactory and profitable results. A complicated ration is not necessary. The aim in feeding the hens should be to use, so far as possible, the grains which are grown on the farm or which are available in the immediate neighborhood. One of the most successful methods of feeding is to give a light feed of grain or a mixture of grains in the morning and a feed of the same material at night, the night feed consisting of about as much as the hens will clean up.

In addition, a dry mash should be provided where the hens can have access to it continuously. When considerable quantities of waste food are available for the hens to pick up from the fields the amount of grain fed may be cut down. Oftentimes judgment in this respect is faulty, and but for the dry mash there would be danger that the hens would not receive enough feed. With the dry mash at their disposal, they are able to make up any deficiency of feed due to faulty judgment as to the quantity they get in the fields.

One of the most common mistakes made in feeding farm poultry is failure to provide animal food in some form. Of course, during the spring and summer, when quantities of insects are available, they may supply the hens' wants in this regard, but during those parts of the year when insects are not available, or are scarce, it becomes necessary to provide animal food. Milk, usually fed either as skimmed milk or buttermilk, provides an excellent source of animal food, but when milk is not available the hens should have beef scrap or meat scrap. Although this product is high in price, it is economical and should be included in the hens' ration because of the increased production which will result.

During the winter it is necessary to provide some form of green or succulent feed, such as mangels, cabbage, clover, alfalfa, or sprouted oats.

#### AN EGG A DAY PER PERSON.

How many eggs can be expected by the novice in chicken and egg raising on the farm? United States Department of Agriculture poultry specialists set an average of 100 eggs per hen as the lowest number which should be accepted as satisfactory.

## USE OF SULPHUR ON ALFALFA FIELDS.

By Herbert D. Newell, Project Manager, Klamath Project.

**E**XPERIMENTS were begun in 1917 by the Oregon Experiment Station to determine the effect of applying sulphur to alfalfa fields in Klamath County. Sulphur was applied that year in a small way on the ranches of F. T. Nelson, Burrell Short, and Frank McCornack, and the experiments were continued during 1918.

The first shipment of sulphur, for the purpose of applying it to an entire field, was made by Frank McCornack during the summer of 1918. Five hundred pounds of sulphur were secured and applied. Owing to lack of moisture, little benefit was observed until the spring of 1919. The next shipment for field use was made by H. N. Moe, who shipped in 1,000 pounds and applied it to approximately 10 acres of alfalfa in the fall of 1918. The sulphured area included a portion of an 8-year-old field and a portion of a 2-year-old field.

The first carload of sulphur was brought in by J. W. Siemens in the spring of 1919. Part of this was used by Mr. Siemens on his Ankeny Ranch and the remainder by other ranchers. An effort was made to have all who applied sulphur leave unsulphured check plats in the fields in order that definite data might be obtained as to the increase due to the use of sulphur.

Striking indications of the benefits resulting from the application of sulphur were obtained during 1919. On the McCornack Ranch, without sulphur, two cuttings yielded 4.2 tons per acre; with sulphur, adjoining tracts yielded 6.4 tons, or an increase of approximately 50 per cent. On the F. T. Nelson Ranch, without sulphur, the yield was 1.2 tons per acre; with sulphur, 3.1 tons. Mr. Moe estimates that during the season of 1919 the yield of the older alfalfa was fully doubled by the application of sulphur, and that there was about a 40 per cent increase on the newer seeding.

As a result of the demonstrated benefits of sulphur, 4 carloads, totaling 236,000 pounds, were secured through the farm bureau and applied during the fall of 1919 and the spring of 1920. Approximately 2,360 acres were sulphured at the rate of 100 pounds per acre, 93 farms being represented. Trials were made in all parts of the county where alfalfa is grown. In addition to information received from nearly all those using sulphur, samples of the second growth were taken from measured areas in 27 different fields. The average increase shown by these samples is 150 per cent, the difference in yield between the sulphured and unsulphured areas being clearly shown by the accompanying illustrations. Apparently the greatest gain was obtained on the

lighter, sandier soils, yet in all cases there was a gain of from one-half to three-fourths of a ton per acre. The gain in tonnage can be stated about as follows: The gain in tons per acre on a good stand was approximately the difference between 5 tons and what the field had previously been producing. In other words, a field that was producing 3 tons when treated with sulphur produced 5 tons.



It was noticed that where a portion of the field was sulphured, this portion would have a growth of from 6 to 8 inches before the unsulphured portions appeared to have started to grow. Hay from the sulphured portions of the fields showed larger and more leaves. The most noticeable increases were secured from fields which were apparently going back; that is, where the yield for the last season or two had dropped off from the former yields, although the stand remained good. Corresponding increases were secured where sulphur was applied to red clover and alsike clovers under similar conditions.

The highest record, where exact weights were obtained, was secured on the Frank McCornack Ranch for the season of 1919. The seasonal-yield of the sulphured area was 15,500 pounds per acre, whereas the average of the unsulphured check areas of the same field was only 11,000 pounds per acre. During the season of 1920 the greatest increase was obtained from a field on the F. J. Bowne Ranch near Bonanza. Here the increase of the second crop shown by the samples taken during August was fully 500 per cent. Another place which showed a remarkable increase was that of Al Marshall, of North Poe Valley. On this ranch two fields showed increases in excess of 400 per cent. The smallest increase obtained as indicated from actual weighings was 13.5 per cent, from a ranch near Merrill. An older field on the same ranch, however, showed an increase of 43.3 per cent. In both cases

the yields without sulphur were already considerably above the average of the county.

Sulphur should be applied at the rate of about 100 pounds per acre. On account of weather and labor conditions, it will usually be preferable to apply it in the late fall in this locality. The application may be made by sowing broadcast, but it is more satisfactory to use a machine such as a land plaster sower. If broadcasting is done, it will be advantageous to mix the sulphur with an equal weight of damp sand. Care should be taken to avoid fire, as sulphur burns readily.

As shown by the F. T. Nelson Ranch near Worden, one application of 100 pounds of sulphur to the acre will give increased results in alfalfa hay for at least four years. On the Nelson Ranch during the 1920 season there was an increase of 130 per cent on the second cutting in the field which was sulphured in the spring of 1917, as compared with the unsulphured check area in the same field. The use of sulphur for increasing the yield of alfalfa in Klamath County is no longer an experiment. It can be recommended as an economic practice. With an initial cost of approximately \$3 per acre for an application, the results of which will last through at least four seasons, an increased yield of from 1 to 2 tons per acre can be secured, which should assure around 5 tons of hay per acre with an average stand. It is of interest to note that, according to Prof. Reimer, of the Oregon State Experiment Station, the feeding value of alfalfa is increased where sulphur has been applied. This can readily be understood when the difference in the size and amount of leaves is noticed.

Acknowledgment is made to E. H. Thomas, county agent for Klamath County, Oreg., who has zealously advocated the use of sulphur, and who kindly supplied the data on which this article is based.

### RECLAMATION RECORD PRICE INCREASE.

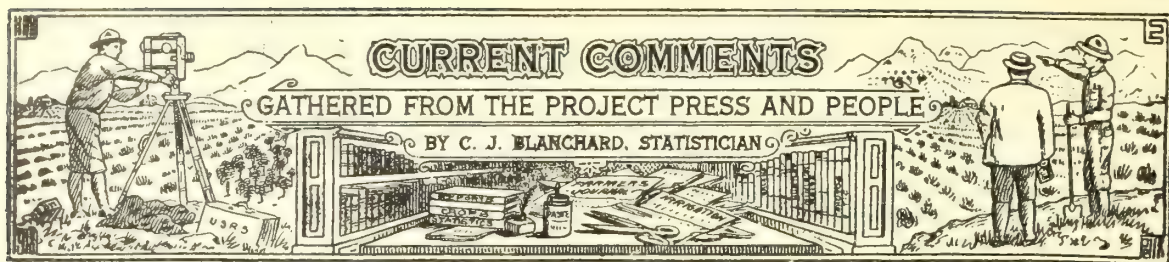
Owing to the increased cost of printing the RECLAMATION RECORD, it has been found necessary, in line with the action taken by practically every other publication in the United States, to make a moderate increase in the price to subscribers.

Announcement is therefore made that *beginning January 1, 1921, the subscription price for the RECLAMATION RECORD will be 75 cents per year. The price for new subscriptions and renewals of old subscriptions received before January 1, 1921, will remain at 50 cents per year.*

We regret the necessity for this increase, but feel sure that the ever-increasing value of the RECORD to the farmer, the irrigation engineer, and to others interested generally in the subject of irrigation will more than justify the moderate increase in price.

As heretofore, the water users on our projects will receive the RECORD free.





**D**ECEMBER is the month of retrospection. During the long winter evenings our farmers may find profitable employment in making a careful review of their activities during the year just closing. Such a review of results, be they successes or failures, undoubtedly will indicate causes and point a way by which future mistakes can be avoided. To those farmers who are keeping books and who are thereby enabled to determine accurately the costs and returns a summation of results will be a matter of simple arithmetic. If by means of this summation he is able to interpret the factors which contributed to his success or failure, thoughtful consideration should help him to plan intelligently his operations during the coming year.

It should be apparent if the net income of our farmers during the period of war prices for farm products has not been satisfactory that his methods are faulty and must be radically altered if he is to succeed with his market once more on a prewar basis.

Observations this summer on a large number of projects, Government and private, indicated several factors which are responsible for a lessening of net income and for some of the present discontent of the farmer. In our opinion the most important of these factors is the large farm. Our farmers as a rule are attempting to farm too much land. The large farms are less carefully tilled, indifferently cultivated and irrigated, and with the shortage of farm labor the wastage of crops at harvest time is great. The big farm usually is a one-crop farm, with a peak labor load coming at a time when farm labor is scarcest and highest priced. Harvesting is delayed and over-ripe grain falls to the ground and is lost. The investment in large and expensive machinery for handling this crop and utilized only once in the year entails a very heavy overhead, and with depreciation and cost of repairs reduces the net income materially.

Comparisons of the results obtained by farmers on 40-acre units with those of their neighbors on 80 and 160 acres almost invariably showed the former to be the most successful. While the gross income from the larger units was greater, in almost every instance the smaller unit closed the year with a larger net profit. At the same time the smaller farm was in better condition as to fertility. The farm buildings and stock were also superior.

As a rule the lesser areas were intensively cultivated in diversified crops. The demands for outside labor were few and usually were met by an exchange between neighbors. The exchange of farm implements between the small farms was frequent, so that machinery was in constant use instead of remaining idle for long intervals. In numerous instances we found power equipment owned by groups of farmers and operated for joint benefit. These economies of cooperation in labor and equipment relieved the farmers of worry and resulted in material savings in investment.

Very satisfactory indeed were the returns of the small farmers, who under intelligent guidance effected organizations for producing and marketing special crops. We call to mind a number of these associations which were operated successfully to produce crops like cabbages, Irish and sweet potatoes, beans, cantaloupes, watermelons, small fruits, and truck. In other lines, such as dairy products and pork, similar associations have been instrumental in greatly improving the strains of milk cows and hogs to the profit of the farmers.

Encouraged by their success, many of these associations are broadening the field of their activities by consolidating, by erecting large storage and packing houses, and by arranging to finance their members during the growing season. In those localities where the farm bureau is functioning properly its service is extremely helpful. Through it the farmers are made acquainted promptly with the market conditions all over the country, and through their market manager are able to deliver their products where prices are the best.

Associations of these kinds are entirely practical on all our projects, each of which is adapted to the production of one or more special crops for which the demand is usually good. An important function of these associations is to determine in advance the acreage and the kind of each special crop to be grown by its members. Rules are laid down as to the method of growing, the style of package, and the grading for quality and size. Crops so marketed are usually labeled attractively and are guaranteed as to quality by the association. These brands quickly become known in the markets and the product is usually in demand at top prices.

Throughout the country the fact is being emphasized that farming is lagging behind because it is not

organized. By means of organizations like those mentioned, all of which are capable of being greatly expanded, many agricultural communities can be lifted out of the rut and farm life can be made immeasurably more attractive.

Community organizations of this kind make a powerful appeal to the young men and women of the country. The graduates of our agricultural colleges furnish excellent material from which to select the leaders and instructors. In the growing of many of the crops, especially truck and small fruit, the children are easily interested and are often the most successful. Their earnings are ample and the training obtained under scientific teachers is invaluable.

Here is a subject for debate and counsel on many of our projects during the winter evenings. It is always easy to secure the services of the experts from the State college in making plans for community clubs next year. The young men and women on our projects have a great opportunity before them this winter along the lines herein suggested, and we are hopeful that many plans for community association and organization will be worked out.

It is not necessary to confine these associations wholly to commercial purposes. Each can be made to serve the social needs of the community. Frequent interchange of thought in practical matters relating to the farm need not occupy all the attention of the meetings. Music, dancing, debates, the old-fashioned spelling bee, interesting talks from those who have traveled, and other forms of entertainment can be provided.

In our youth back in Iowa the young people of the town regarded the spelling bee in the country school-house or the straw ride and the dance in the big barn as the rarest treats of our winter's festivities. Why not revive them all again? The town of late has been luring the country folks away from their homes. Let us see if this can not be reversed. Let us invite the town to come out and see the country this winter.

From a number of our projects come reports of phenomenal yields. In each of these reports there is a story of genuine human interest, but how are we going to get them for the *RECORD*?

When the thrashing machine sacks 85 bushels of wheat per acre from a farmer's field, there's a grand story hiding away in those sacks. It's a story that should be published widely, for that was an achievement as important and as worthy as painting a masterpiece. You well know that wheat never grew in a weedy field. You know the seed was carefully selected, treated, and that before it was planted the field in which it grew was properly tilled. Now wouldn't you like to know every little thing that farmer did to make such a crop of wheat? Of course you would. There's the fellow who raised 500 bushels of certified spuds per acre and sold most of

them for seed because they were perfect. Wouldn't you like to have him tell you in words of two syllables or less how he did it?

Bill Jones or Brown, at whom you were very much inclined to sneer because he persisted in puttering about on a 10-acre tract raising onions for seed by hand, suddenly jumps into notoriety by producing a crop which sells for \$600 an acre and buys a seven-passenger car with which to flaunt you. Don't you want him to tell you all about it?

There's an old couple bowed with years, but full of vim, on one of our projects who played around on 10 acres last summer, had a perfectly lovely time in the open air, and produced the most wonderful garden in the whole valley. Folks liked the fruit and garden sass so well they just insisted on paying the old folks about \$2,500 for what they came and hauled away in their autos. Don't you wish they would tell you about their great adventure this summer?

I remember hearing about a little girl in the West who played mother to a sick calf and brought it through safely, and then discovered that the calf was a blue-ribbon winner and worth several thousand dollars. How I wish she would tell us all about it.

Every one of our projects has its stories of this and other kinds. Please won't somebody start telling them in the *RECORD*?

#### NOTED HERE AND THERE.

*Arizona, Salt River project.*—The *Arizonian* of Chandler contains the following:

That coffee can be grown successfully and in commercial quantities in the Salt River Valley, has been demonstrated by Jack Gray, a well-known rancher living southwest of town, who harvested a small acreage of the bean.

Last year Mr. Gray received a small shipment of seed from the Government with the request that he plant it and report his findings to the Department of Agriculture. He did so, and secured enough seed from his last year's planting to put in about half an acre this year.

His observations are that coffee does well in this valley. He planted his seed in February of this year, but says that is not necessary and that the plant will do just as well if planted early in July, as the bean did not set out until August; that, in fact, the growth of the plant did not really start until July.

The harvest is quite abundant and Mr. Gray is saving enough seed this year to plant at least an acre next season. The plant is similar to cowpeas, grows in bushy formation, and sets on more pods than the cowpeas.

We always thought coffee grew on a tree, and required about three years to produce a crop. But you never can tell, especially if it's in the Salt River Valley.

*Arizona, Yuma project.* Yumans this season went dippy on cotton, and many growers are hard hit by the low prices. A few who wisely contracted their cotton last spring at 60 cents a pound will come



through with a profit, but a lot of other fellows who dreamed of a dollar a pound and can't get 30 cents are up against it. While the situation is critical for many, the valley may be the better in the end for this period of trial and tribulation. It is evident that had 1920 been as good a year for the cotton grower as 1919, Yuma Valley would not be growing enough alfalfa in 1921 to take care of the local stock. We never want to see this valley turned into a one-crop country, and the painful lesson of 1920 may not be without benefit after all. No other part of the United States excels Yuma Valley in the variety of its crops, and diversity of crops usually means a prosperous region with ready money all year round. Raise cotton, yes; but not to the exclusion of other crops, many of which are actually just as profitable.

Keep up the soil fertility with alfalfa and live stock.

Cotton growing in Yuma Valley has done one important thing. It has markedly improved the methods of soil cultivation.

Now that the election is over and matters are growing normal again, we look for some speed in the promotion of a district for the next unit on the mesa. We wish every Californian who thinks he knows a lot about oranges and how to grow them could look over the Hill orchard on the mesa. We are confident his verdict would be that California can not equal these 4-year-old trees loaded with oranges and grapefruit.

*Colorado, Grand Valley project.*—As a result of a visit to this district some weeks ago of F. B. Headley, ranchers of the High Line districts are becoming interested in dairying as a side line to their ranch activities. Mr. Headley was sent here to investigate their needs and to make a study of local conditions. His report was so surprising, showing, as it did, the great need of dairying, hog raising, and poultry on the High Line ranches, that a great interest has since been taken in these questions.

County Agent McCann has been cooperating in the work since the departure of Mr. Headley and he expects to leave soon for the East, where he will purchase one and possibly two carloads of young dairy cattle for High Line ranchers. One carload of these cattle—all milking Shorthorns—will be purchased by ranchers of the Enterprise community near Fruita. Ranchers of the Loma and Mack districts are expressing a preference for Holsteins, and now plan to order a carload of cattle of this breed, 20 head being loaded to the car.

The banks are cooperating with the ranchers in the purchase of these cattle, and it is probable that additional carloads will be ordered later and that dairying will be taken up as one of the chief departments of High Line ranching. More hogs and more poultry will also be found on the High Line another year as

a result of the visit of Mr. Headley and the active work since of County Agent McCann.

*Colorado, Uncompahgre project.*—Frank Williams has probably the prize yield of spuds this year, as Tom Shinn, who is buying produce for the Rupp-Nahstoll Produce Co., reports that he purchased part of the Williams crop, which will make 230 sacks to the acre.

The farmers and business men at Nucla are intending to build a new cheese factory. W. A. Hopkins had built up quite a trade in the surrounding country on the quality of his product, but just as things were going nicely the plant burned down.

County Agent Ben King and Deputy State Horticulturist H. D. Lockland recently completed inspection of the certified seed potatoes in the county and reported that many of the growers passed the inspection.

G. B. Thayer and Joseph L. Masse, of Log Hill mesa, have a splendid crop of the certified potatoes, and will have a small amount of them for sale this year to other growers. E. C. Dunlap, George Howell, and Alvin Rouse, of Bostwick Park, passed the inspection on their certified spuds. Loesch Bros. and John E. Reynolds also passed the inspection. An interesting fact is that last year Felix Baranowski, of near Olathe, procured a small amount of Cobblers from Mr. Masse, of Log Hill, and this year harvested 229 sacks to the acre from the planting.

*Idaho, Boise project.*—How does a yield of \$625 per acre seem to you? This is what the growers on the bottom lands along the Boise River from Boise to Star are getting from land planted to early potatoes and celery this season, according to reports. The net profit, it is said, will be close to \$450 per acre, which is the highest profit to be realized from any crop, unless it be head lettuce.

Boise Valley celery has now reached a degree of popularity that it is competing in the markets of the Middle West with California, Utah, or Colorado celery, which has long had an established market. Owing to the unusual quality of the celery grown in the Boise Valley this year, the wholesale price has reached 35 cents a dozen. It is estimated that close to 50 cars will be shipped from this region, unless caught by exceedingly cold weather. Last year about 30 carloads were shipped.

The Ada County Cow Testing Association reports 100 per cent pure-bred sires. This record represents some 38 registered dairy bulls in the association. The pure-bred sire campaign and the efforts of D. L. Fourt, association tester, receive the credit for this achievement. There are only two herds in the association that have not been tested for tuberculosis. The association is working for a 100 per cent tuberculosis free association.

Because they entered the best pig on exhibition at the Junior State Fair, Harvey Lellington, Weiser, and Seymour Lee, Nampa, were awarded \$200 in prizes and will be given trips to attend eastern stock shows, it is announced.

Armour & Co. will pay the expenses of Lellington to the International Stock Show at Chicago. The Union Stockyards at North Portland will send Lee to the Pacific International Stock Show at Portland.

Three acres of pears from the farm of John Steel, of Parma, will total 600 to 700 boxes, it is estimated. At the present price of pears this will bring him approximately \$2,100.

Six hundred pounds from a hundred-foot row of Canadian variety of potato is the record of a Boise Valley merchant, J. W. Martin, of Star. This is at the average of 1,400 bushels to the acre. The ground in and around the vines was literally filled with potatoes, said Mr. Martin.

*Idaho, Minidoka project.*—A definite decision has been reached to increase the capacity of the Burley Sugar Factory to handle 1,200 tons of beets per day. In order to do this it will be necessary to remodel the present plant and install much new machinery. At the same time the local factory will be made up to date and modern in every particular.

The capacity of the factory at Paul will be increased from 650 to 900 tons daily. This action is being taken by the sugar company to take care of the increase in acreage of sugar beets promised here during the next few years. There is no section better adapted to beet culture than the Minidoka project, and there is no question but what more land will be devoted to the crop each year.

Alfalfa seed amounting to 1,602 pounds from a 2-acre patch is the yield received by D. B. Blinsø on his farm 2 miles south and a mile west of Paul.

Mr. and Mrs. W. E. Kennedy, recently from Kansas, are farming near Rupert, and believe in keeping dairy stock on the farm. "I have been selling 50 pounds of butter a week from the seven cows we have had," said Mrs. Kennedy. "We are former Iowa and Kansas farmers and believe in the dairy cow as a producer of revenue on the farm. We would not be without them."

John Norby, living 3 miles southeast of Rupert, shipped in 900 lambs last week from Enterprise, Oreg., on a feeding contract. This is only one instance in a great many where Minidoka ranchers have gone into this end of the game, and bids fair to be a money-maker.

W. S. Irving, one-half mile north of Rupert, has shipped in 1,200 head of lambs from Oakley to feed during the season.

C. E. Bouse, 1 mile north of here, received a shipment of 1,200 lambs from the Mackey country to feed.

Andy Biehl, of near Heyburn, has received 3,000 head of feeder lambs from the Oakley section, and will utilize some spare time in putting on the specified "12 pounds per head" in the next 60 to 90 days.

Olson & Nielson expect to ship in 2,500 head of lambs to feed this winter. They have bought a great quantity of beet tops in this county and expect to convert them into an A No. 1 grade of lamb chops and fricassee.

The best feed in the world for this purpose is found right here in Minidoka County, and the farmers intend to conclusively try out the proposition of using it up in this way instead of shipping it out. It is a sensible plan and no doubt will prove quite feasible as a money-maker.

*Montana, Sun River project.* G. O. Sanford, of Great Falls, was elected president of the Montana Irrigation and Drainage Institute at the final session of the association's convention in the Commercial Club Building on November 10. I. D. O'Donnell, of Billings, the retiring president, was elected first vice president. The convention delegated to the new executive committee the matter of selecting a place for the 1921 convention.

Resolutions asking that the State legislature provide for the making of a soil survey of the State; that county assessors be required to compile irrigation statistics for public use; that the State cooperate with the United States Geological Survey in stream measurement; and that engineers in the State be required to obtain licenses were adopted by the convention at its final session.

*Nevada, Newlands project.*—The following from our good friend L. E. Cline is full of meat:

A record of alfalfa hay with a slow and uncertain market has caused an almost universal longing for the presence of dairy cattle in large numbers. It is not hard to figure out that with sufficient high-producing dairy animals in the valley to consume our present crop of alfalfa hay the final returns from the alfalfa crop could be looked forward to as something definite. It seems a shortsighted policy for this valley to devote such a large proportion of its energy to the production of alfalfa hay and depend almost entirely on outside markets. If other sections can buy our hay and utilize it at a profit, why can't we? It is reasonable to suppose that it is utilized at a profit; otherwise it would not be purchased. All hay that is purchased locally for use in other places for dairy production (and most of it goes for dairy production) must return a profit to the purchaser and in addition pay railroad transportation, delivery to and from the stations, and cost of baling. Now does it seem reasonable that with the hay on the ground and all extra charges for transportation, commissions, etc., eliminated, we are at a big advantage as a dairy section?

The alfalfa growers of the project launched a movement which should prove to be one of the most far-reaching and good-producing efforts ever made in this community. It is the organization of an alfalfa



growers' association. It has long been considered essential to the best interests of the project to spread out in the matter of products, and this need has been greatly accentuated during the past few weeks by the poor market for alfalfa hay. The opening of the sugar factory and the planting of beets by the farmers will help somewhat to relieve the situation, but the organization which was formed yesterday will go a step further and try to induce dairymen to bring herds to this valley, where they may be either placed on leased farms or tracts or buy farms of their own, the object being to create a home market for the alfalfa.

Fred Hinze, representing the owners of the Fallon Sugar Factory, has definitely announced that the factory will be operated next year. A campaign of paying proportions is held in prospect as a result of the cooperation of the farmers of the project who have almost uniformly responded with alacrity to the request for beet acreage. Mr. Hinze emphasizes the fact that the announcement must not be taken to mean that a sufficient acreage has already been secured, but that twice the signed acreage at this time will be needed to make the enterprise pay.

High hopes are entertained that the farmers of the valley will be able to collectively raise between 4,000 and 5,000 acres of beets during the 1921 season, an amount that will be increased regularly each season thereafter as the advantages attaching to diversified farming come to be more generally understood.

*Oregon, Umatilla project.* Project Manager Schil Bag, reporting the Eighth Annual Dairy and Hog Show on the Umatilla project, which closed in a blaze of triumph, writes:

The Dairy and Hog Show is an evidence of the interest of the people in the highest and best type of farming known as permanent agriculture. It is true that frequently during the earlier stages of reclamation development the farmer resorts to the expediency of selling his crops to secure ready money; but the later stages of development afford a splendid opportunity to secure and breed the finer types of animals, which produce food products, or in the end become finished food products, and thus are a profitable investment.

All lands are subject to the law of diminishing returns. The permanency and intelligence of an agricultural community are ultimately judged by the efforts of the farmers expended in maintaining soil fertility. The economic use of water, crop rotations, proper fertilizers, animal husbandry, and building improvements are indicative of intelligent farming. And seldom, if ever, are better opportunities given a people for such a type of development as on the reclaimed arid lands in the West.

*South Dakota, Belle Fourche project.*—The sugar-beet industry under the project is receiving a major portion of the attention of our irrigation farmers, and more interest is manifest now than at any time since the first meetings for the signing of contracts some five years ago.

J. C. Milne, of Sturgis, who conducts several farms in the vicinity of Vale, evolved the following plan which he talked over with several farmers and business men, and it was adopted. A large acreage is to be placed under valid contracts and presented by a committee representing the farmers to any sugar company which will enter an agreement to build a sugar factory within the Belle Fourche Valley. No factory; no contracts.

Preliminary meetings were held at several points, but at Vale in a big booster meeting the big drive for acreage was actually set in motion. At this, as in subsequent meetings, the contracts were read and discussed and cheerfully signed. Nearly 2,000 acres were signed at this meeting alone. At Arpan over 800 more acres were added, and at Newell 750 additional acres were added. To this total have been added about 1,500 more acres on contracts secured by committees working from these meetings.

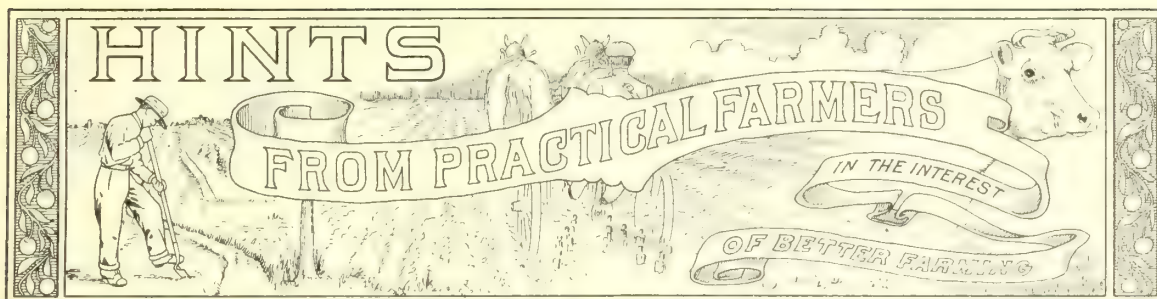
*Washington, Yakima project.*—Restoration in part of prewar conditions was evidenced recently in Yakima in the shipment of a quantity of apples to Australia. Yakima apples have long been in popular favor with our Australian cousins, but the tie-up of Pacific transportation cut off this channel of trade completely.

The Yakima project farmers, owing to the diversity of their crops and their numerous organizations for marketing, have come through the year in better shape than most of their brethren in other parts of the country where the one crop custom prevails.

In answer to queries from State reclamation officers for 10,000 acres in the Yakima Valley available for settlement purposes under the State land settlement act, the Commercial club's irrigation committee went on record as indorsing three tracts as possibilities. They are one 20,000-acre unit in the Moxee Valley, one 10,000-acre unit in Wenas, and one 10,000-acre unit in East Selah. Each would be an ideal place for such a proposition as stated in the land settlement act, the committee considers.

All these tracts depend on the Rimrock project, which is as yet incomplete. But as the board will not have sufficient funds for immediate settlement of the land, there is no doubt that the water could be gotten on the land by the time the necessary funds were on hand, if the Rimrock project was carried through. All the sites recommended to the State board are comparatively near paved roads. The irrigation committee seemed to favor the East Selah unit, because it was a little further developed than the rest and showed better prospects.

Land is wanted in 10,000-acre units in order that there may be a real settlement with a village blacksmith, a store, and a bank. The lands are to be bought by the ex-service men on a 40-year amortization payment plan. The club is anxious that the State board should decide upon the Yakima Valley as a suitable location for a unit. —C. J. B.



### Prosperity Shows Results of Bankers' Aid to Farmers.

Cooperation between bankers and farmers in the acquirement and distribution of high-class animal and plant stock is helping to promote a prosperous condition in Wisconsin, the United States Department of Agriculture is advised. The Banker-Farmer Exchange conducted under the auspices of the Wisconsin Bankers' Association listed 2,131 head of cattle, valued at \$281,000, during its first year of operation, and obtained inquiries for 1,698 head. The exchange has its headquarters at Madison, the State capital. A commission of 5 per cent, paid by the seller, is charged on all sales made through listings to cover expenses, but no charge is made on sales outside the listings.

When a farmer lists live stock for sale he signs a statement on the listing blank that the animals are healthy and sound, except when otherwise stated, and that the cattle have been or will be tested for tuberculosis. Male animals to be used for breeding purposes must be pure bred. With every transaction two banks and the exchange are concerned, and if there is any dissatisfaction both banks know it. A breeder can not afford to risk his standing with his bank by misrepresenting his product. Should he attempt it, he loses the privilege of the service. The farmers are fast becoming acquainted with the exchange and are forming the habit of reporting their wants to the local banks.

### Increasing Crops by Use of Sulphur.

Farmers in Oregon and Washington have greatly increased their alfalfa crops by the application of sulphur. This practice is based upon the results of investigations by the experiment stations in these States, as well as of demonstrations of the use of sulphur on alfalfa conducted by the county agricultural agents in cooperation with specialists from the agricultural college. In Deschute County last year 285 tons of sulphur were used, at a total cost of a little more than \$14,000, and the increased yield, reckoned at \$20 a ton, was \$120,000. In Jackson County 277 tons, costing about \$13,000, are estimated to have increased the yield \$110,000. In Klamath County 98 tons, costing \$5,400, gave an estimated

increase of \$40,000, reckoning alfalfa at \$15 a ton. Demonstrations in Josephine, Wallowa, and Wasco Counties give a similar ratio of results. The first experiments in sulphur fertilization in these States were made in 1912. Rapid development of the innovation was made possible through the system of county agents and key men who were practical farmers.

This issue of the Record contains an interesting article describing the results obtained from the use of sulphur on the Klamath project, Oregon-California.

### Sunflowers for Silage.

SUNFLOWERS are being extensively grown for silage in parts of Oregon, Washington, Idaho, and Montana where climatic conditions are such as to make corn growing for silage uncertain. Sunflowers yield as high as 7 or 8 tons to the acre, and when cut green for silage have not developed enough wood in the stalks to seriously impair their use for cattle feed. Growing of sunflowers is being encouraged by the county agents, and extensive tests of the action of silage on sunflowers are being made at the United States Department of Agriculture experiment station at Redfield, S. Dak.

### Better Mousetraps—and Yet Better.

If you make a better mousetrap than your neighbors,

'Tis said that though the forest hides your hut,

Other men will so appreciate your labors

That they'll break a path to find you, and, bejabbers,

After that they'll work with fountain pens and Fabers

To bring both wealth and fame upon you. But

If you raise a better breed of hogs or cattle,

Instead of paths they'll build up to your door

A railroad track, on which will daily rattle

Trains bringing men from Boston and Seattle

And half the towns which lie between, to battle

For all the stock you have for sale and more

Nor can you hope to dwell on any byway,

If you produce a truly better breed

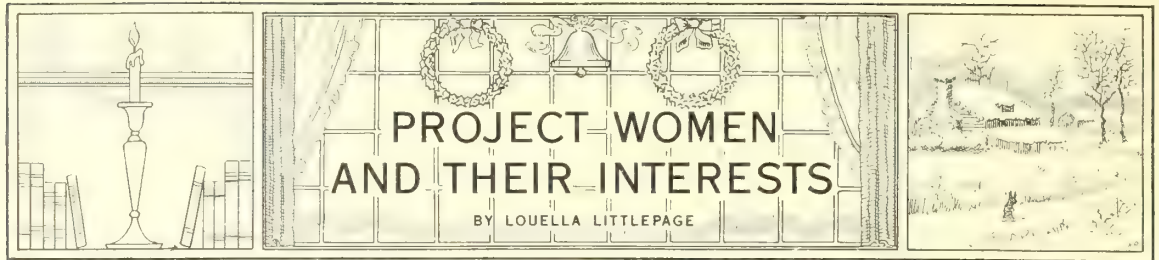
Of any good farm product. A great highway

Will come to you the most direct and high way

And you'll live easy in the soft-aspie way,

Because you've got the stuff folks really need. /—S





**M**ILLIONS of mothers throughout the length and breadth of the land are filling receptive little minds these days with anticipation of the joys of Christmas time, but how are you telling the story, little Mother? Does your child look forward only to getting everything his letter to Santa called for or does he know that nearly 2,000 years ago on that day God gave His own little Son for His sake, and that the spirit of the day is giving, not getting?

Last year gifts were being distributed in a certain home for orphan children. Many of the gifts were things other children had grown tired of, and others were not quite sensible gifts for little children. One was a large, festive-looking cake. An understanding lady stood holding it in her hands and wishing that the careless donors were there to see the children looking wistfully at the few really desirable contributions. Suddenly she noticed a quiet little chap standing back in one corner and looking on in a detached way as if he had no personal interest in the matter. She went to him and put the cake in his hands. He looked up into the smiling face of the lady, then at the big cake, and a great wave of joy swept over his face. "Oh, Miss Brown, is it really mine to give away?" he exclaimed. "Please give me a knife," and at once he was part of the celebration. The cake, cut in many pieces, he passed eagerly among the children and guests. He was no longer solemn and silent; he was alive and joyous. He had something to give away.

In our desire to make Christmas the happiest day of the year for the children, unless we have a care we shall make the mistake of doing everything for them and allowing them no share in the holiday preparations or the gift giving. Even the tiny ones can wrap tinsel paper around cardboard stars and crescents or string popcorn or cranberries to hang on the tree Santa has sent to them. The slightly older ones can make bright paper chains and cornucopias. They won't do the work as nicely as you may wish, and it may be a great bother to stop in your busy rounds to show them how now and then, but the interest they will develop in the preparations will more than repay for the labor involved, even though the work has to be done over again when they are fast asleep.

As to gift making, the earlier a child is taught that more happiness is gained by giving than by receiving, the better for his moral development. I have known children 10 years old or more who have never made or bought gifts for their little friends. Their mothers saw that presents were bought for all, and these gifts were sent out by them with the child's name attached as giver. And I have known little chaps of 3 and 4 who have experienced all the joys of giving by saving their pennies and, with Mother's help, spending them on gifts for little friends and members of the family—gifts which they helped Mother wrap and which they addressed with the aid of Mother's hand to guide the uncontrolled fingers.

See that they give all their outgrown toys and books to less fortunate children they know or to hospitals or homes, *but* see that they learn that the gift which costs them a real sacrifice is the one which really counts.

As soon as a mother hears the inevitable, "I want such-and-such for Christmas," she should endeavor gradually to lead the child to thinking, "I want to *give* such-and-such at Christmas time." It is not hard to do. Ask him confidentially what he supposes brother wants. He'll have an answer on the tip of his tongue. If it is feasible, suggest what fun it would be to surprise brother with it on Christmas. Talk about it when brother isn't around. Make a little secret of it and plan how it can be made or purchased. Soon you will have the child as eager over the surprise he is going to have for brother as over any gift he may be anticipating for himself.

See to it that the children make little gifts to each other and to Daddy and other members of the family. Encourage them to save their pennies to buy things or to come to you for suggestions as to gifts they can make. And be careful "not to have eyes" as the wonderful day draws near, for crudely made little treasures for Mother are apt to be stuffed away anywhere.

No one is so poor she can not make a gift. Maybe it is only a newsy letter bubbling over with good cheer for some neglected friend; or some nice fresh vegetables from your cellar; or a few jars of fruit or glasses of jelly; maybe it is a little dried lavender for the linen chest, or sage from your garden for their

Christmas turkey; or perhaps a bit of Christmas cake or pudding garnished with a bit of holly or red berries or ribbon, but sent with a warm greeting, or maybe its a bit of tatting, or crochet, or thread lace, or a little candied fruit. How about an attractive plant, especially for an invalid or for the busy woman who was not farsighted enough to provide some growing thing for the winter days?

Instead of saying, "If I were rich I would have something to give," remember the Persian proverb: "I have something to give; therefore I am rich."

### Another Christmas Suggestion.

A scrap of torn newspaper, printed I know not where, caught my eye this morning. It contained part of an article on The Sunset Club, and awakened curiosity as to just what kind of a club this might be. It seems that it is a club for the sunset years of life, the only requisition for membership being that the candidate is 60 years old or more.

The lady who started the club did so because, although her own situation was most agreeable in her sunset days, she found that she was really "on the shelf," and many of her friends were being thrust there who, unlike herself, were too timid to get off.

"I have the most pitiful letters," she told a reporter, "from all sorts of old ladies who want to join our organization. What do you think of a woman, devoted to her church, who never attends a meeting because she has no money to put in the contribution box and doesn't like to ask her daughter for any?"

The club members have no protest against ill treatment. On the contrary, most of them insist that they are overcared for. They are seldom allowed to go out alone for fear they will be hurt. The club has changed all that. Sunset mothers, grandmothers, great-grandmothers, and old maids have become emancipated, and there isn't an afternoon meeting or an evening special that they miss, and the oldest member is 93 at that.

These Sunsetters are not idle. They did much Red Cross work during the war, and they made a silk flag which flew over the battleship *Recruit*, and under which 75,000 men enlisted. Their needlework and knitting enables them to send \$60 a month to the women of devastated France who are also of the "Sunset" age.

Have you an eligible to the Sunset Club in your home? A Father or Mother perhaps who toiled long and lovingly for you in your helpless days and whom you are now sheltering and caring for in turn? Of course, you feed and clothe them and maybe give them the most comfortable room, but has it ever occurred to you to give them a little pin money?

"I never have any money to treat a friend to soda water," a little old lady exclaimed in my presence not long ago. It voiced a real tragedy. Don't get

the idea that because Mother is 75 years old she doesn't occasionally long to go to town and buy an ice-cream sundae; that Father wouldn't like to stand treat to something once in a while if only he had a few cents.

Why not make a Christmas gift to your Sun-setter—the first installment of a regular allowance, no matter how small. Try it and see if the happiness it brings doesn't prove a boomerang.

### Save Time and Energy on Wash Day.

By Mrs. Susa Young Gates, Editor, The Relief Society Magazine, Salt Lake City.<sup>1</sup>

**I** CAREFULLY read the Women's Department in the RECLAMATION RECORD and have often wished I had time to send you some of our good recipes.

I think I shall steal time to tell you a little discovery I have tested for many years. It is in regard to washing. I have been the mother of 13 children, and help was hard to get when we lived south of here in a country town. I have done my washing since the children have been married, and entirely alone. I had an electric washer for some years, but finally gave it away, for I learned two things by long experience. First, that dry clothes can be put into cold water, or warm water, or hot water, or boiling water on the stove with soap and washing soda and allowed to boil 20 minutes or one-half hour without boiling in the dirt or injuring them in any way. I also relearned what my mother had taught me all my young life, that rinsing clothes is of more importance, if possible, than washing them.

I boil dirty clothes twice, both times in clean water with fresh soap and soda, except, perhaps, taking some of the most soiled clothing through a second suds that has been used for the first clean things like napkins and tablecloths. It takes more soap and soda, but it does not require any hand labor at all. The clothes are rinsed thoroughly. I use a little cold-water washer which my son invented, but has neither time nor money to put on the market. It simply rinses the clothes by centrifugal force, sweeping the water round and round as it flows from the top. This cleanses every particle of suds out of the clothing, and they are white and clean when they come out.

The proportions of soap and washing soda are a bar of soap and two tablespoonfuls of washing soda where water is hard, not quite so much soda where water is soft, to a large boiler of clothes.

I do not like the sal soda put up in packages on our local market; it is so charged with sulphur that it turns the clothes gray if a little too much is used, or if they lie in the water too long. It also colors all the silverware that comes near it.

This is not fixed up in the shape of a recipe, but is just a little talk to those who are working hard like I am.

<sup>1</sup> Mrs. Gates is a daughter of Brigham Young.—Ed.



## Reclamation Record Cook Book.

CHILE, HUEVO CON CASSE.

By J. J. Burkholder, engineer, Denver Office.

[Authors: Gen. Marshall, D. W. Murphy, and Andrew Weiss.]

No. 1:

2 chopped onions.  
4 ounces of chopped bacon.  
Fry slowly for 30 minutes and stir, then add  
1 can tomato soup  
1 can green chile, chopped.  
2 tablespoonfuls catsup.  
Cook slowly for 12 minutes.

No. 2:

In a separate dish put--  
1 pint of milk.  
4 ounces of cheese.  
Heat until cheese is dissolved.

No. 3:

Four Nos. 1 and 2 together and add 6 eggs, and stir.  
Cook until thick and serve on toast.

Mr. Burkholder recommends this especially for drainage men.

PARKER HOUSE ROLLS.

By J. E. Sullivan, clerk, Denver Office.

1 cake of yeast in 1 2 cup warm milk, add flour enough to make soft sponge. Let rise 1 1/2 hours.

1 1/2 cups milk warmed and heaping tablespoon lard dissolved in it; add 2 eggs, 1/4 cup sugar, 1/4 teaspoonful salt. Add to sponge and add enough flour to make stiff dough. Let rise 1 1/2 hours.

Take out of pan and roll out on board; then form into rolls. Bake 15 minutes in hot oven.

CHOCOLATE ICING.

By Miss Pearl Hopper, clerk, Denver Office.

3 squares chocolate, melted  
Add 1 cup of sugar slowly.  
1 tablespoon of butter.  
Simmer slowly.

Add 1 2 cup of cream and cook until it forms a soft ball.  
Beat a little.

PRUNE FILLER PIE.

By Miss Frances S. Hofmann, clerk, Denver Office.

4 egg whites.  
6 tablespoonfuls sugar.  
16 cooked prunes.

Beat egg whites until stiff and dry, and add sugar slowly. Stone prunes and rub through sieve. Add prune pulp to first mixture, beat thoroughly, pour into a slightly baked crust, and bake a light brown. When cold serve with whipped cream.

PEACH MARMALADE.

By Mrs. W. R. Floyd, La Mesa, N. Mex.

30 peaches peeled and sliced.  
3 oranges peeled and sliced.  
3 oranges sliced with peeling on.  
Add 4 pounds of sugar and boil until thick. Add 1 pound of pecan-nut meats, cook five minutes, pour in sterilized glasses or jars and seal.

DEVIL'S FOOD CAKE.

By C. H. Young, clerk, Denver Office.

Cream 1 cupful sugar and butter size of an egg.  
Add beaten yolks of 2 eggs, 1 cupful sour milk, 1 teaspoonful soda dissolved in water, 1 1/2 cups sifted flour, 4 tablespoonfuls cocoa, salt, cinnamon, cloves, and nutmeg to taste, 1 teaspoon vanilla.  
Bake in moderate oven.

DATE PIE.

By Miss Florence E. Gray, messenger, Denver Office.

3 eggs well beaten, 1 cup sugar, 1 teaspoonful baking powder, 9 large soda crackers rolled fine, 1 cup chopped dates (cut with knife), 3/4 cup of chopped nuts.

Place in hot oven and turn fire low. (Browns quickly and should be watched to avoid burning.)

Serve with whipped cream.

HOT POTATO SALAD.

By C. E. Lounsbery, assistant engineer, Denver Office.

Boil 10 or 12 small potatoes (of a size suitable for frying) with the skins on. When done, chop up 4 slices of bacon and fry in skillet until crisp.

Drain potatoes thoroughly, peel and slice into vegetable dish. Slice into potatoes 2 small onions, add salt, pepper, celery salt, and vinegar to taste, but not enough to make too wet. Pour in bacon and grease and stir until well mixed. Serve hot.

LADY BALTIMORE CAKE.

By Tommy Brown, chief Stenographic Section, Washington Office.

1 cupful of butter	2 level teaspoonfuls of baking powder.
2 cupfuls of sugar.	1 teaspoonful of rose water.
3 1/2 cupfuls of flour.	1 cupful of sweet milk.
The whites of 6 eggs.	

Cream the butter; add the sugar gradually, beating continuously; then the milk and the flavoring; next the flour, into which the baking powder has been sifted, and lastly the stiffly beaten whites of the eggs, which should be folded lightly into the dough. Bake in 3 layer cake pans, in an oven that is hotter than it would be for loaf cake. To make

the filling, dissolve 3 cupfuls of granulated sugar in 1 cupful of boiling water. Cook it until it threads, then pour it over the stiffly beaten whites of 3 eggs, stirring constantly. To this icing add 1 cupful of chopped raisins, 1 cupful of chopped nut meats (pecans preferred), 5 figs cut into very thin strips. With this, ice both the top and sides of the cake, often putting between the layers of the cake.

#### STEAMED FIG PUDDING

By George L. Evans, clerk, Denver Office.

One package figs (grind), add 1 1/2 cups ground suet, 2/3 cup of sugar, 1/2 teaspoonful ginger, 1 teaspoonful cinnamon, 1 cup flour, 1 cup of bread crumbs soaked in 1/2 cup of milk, 2 eggs beaten, and 1 level teaspoonful baking powder.

Steam 2 1/2 hours. Serve with hard sauce, nutmeg sauce, or whipped cream.

#### Prize Winners.

It took three little lassies of the Huntley project, whose combined age total 35, to demonstrate at the Montana State Fair at Helena, Mont., this year, that the Huntley project besides beets, alfalfa, corn, and grain is raising intelligent little girls.



The prize winning team. Left to right: Lillian Cohen, Lillian Lyng, and Minnie Cohen.

The Montana State College, in connection with the United States Agricultural Department in its extension service, inaugurated boys' and girls' clubs under the supervision of one of the teachers of the school, teaching the children and encouraging them in individual agricultural pursuits in a scientific manner, and in cooperation and teamwork.

One of these clubs is the Ballantine Girls' Canning Club. The best demonstrators in the club were chosen to compete for the county championship. They got the verdict. It then fell upon them to defend their title at the contest at the Midland Empire Fair, an

association of several counties, with headquarters at Billings. They competed and again brought home the prize. It then developed that there was a State competition to be had at the State Fair at Helena, and the little ones were rushed to Helena and were declared the winners of the first prize at the State Fair.

The team consisted of Minnie Cohen (captain), 15; Lillian Cohen, 10; and Lillian Lyng, 10 years of age. Both the Cohen and Lyng families are old settlers on the project.

#### The June Bug Baking Club.

This is a Newlands project (Nevada) club, but they have made such an enviable record even in this day of wonderful club records that their accomplishments are a challenge.

The county demonstration agent met with these girls every two weeks and demonstrated the principles of bread and cake making. The girls then returned home and put the principles into actual practice, not only indelibly impressing the lessons upon their own minds but greatly lightening the burdens of their mothers.

There are five members in this club, and during the season, up to October 1, they had baked 230 loaves of bread, 44 dozen biscuits, 36 1/2 dozen muffins, 33 1/2 dozen cookies, 2 dozen rolls, 3 coffee cakes, and 3 batches of corn bread. Mildred Russel, as a result of this training, has taken entire charge of the bread making in her home and has made 132 loaves of bread, 35 dozen muffins, and 34 dozen biscuits. Mabel Russel has assumed the cake making, and has made 35 cakes and 5 dozen cookies. Hildegard Lammell has done both the bread and cake making at home and has made 98 loaves of bread, 1 1/2 dozen muffins, 5 dozen doughnuts, 25 dozen cookies, 2 dozen rolls, 10 dozen biscuits, 27 cakes, 3 coffee cakes, and 3 batches of corn bread. Betty Carmiencke has made 15 cakes and 2 1/2 dozen cookies. Evelyn Caton has been baking at home, but did not keep track of what she accomplished.

#### Minidoka County Sewing Club.

The prize-winning sewing club of Minidoka County, Minidoka project, Idaho, made a ten-strike at the State Fair when it put on a hat demonstration, the first of the kind ever given there, and visitors who were lucky enough to happen at the exhibit tent of the "Juniors" just at the psychological moments saw and heard a highly enlightening and interesting demonstration.

Three bright, capable young girls occupied the center stage and told and showed how to make a fetching sailor hat in 37 minutes at a cost of less than a dollar. Miss Isabel Sirrine, with all the poise and confidence of a well-seasoned demonstrator, showed how to cut the pattern for a sailor hat, which could be quickly modified into a "Chin-Chin" sailor or



polk bonnet. She cut the pattern from buckram, and while Miss Vera Wilhite and Miss Lucile Carrier were each making a hat along these lines, Miss Sirrine gave a little talk on how to select a becoming hat.

She told the lady with the round face what hats to avoid as a plague and what ones to select; the girl with the sallow skin was told what would give her just the right touch of color; the faded, tired mother was advised what would make her look more youthful; and hats for every time and place were described.

The girls are members of the Junior High School at Heyburn, and won the trip to Boise as a prize for their work at the Minidoka County Fair.

### Shining Up the Furniture.

Furniture often looks dull because it gets dirty,

like everything else, but that condition is easily remedied by simply washing it with ivory soap and tepid water, dampening only a small surface at a time and wiping dry with a soft cloth. Then finish up with a good furniture polish, rubbing with chamois or soft flannel until a good, satiny, permanent shine develops. The best and cheapest polish we have found is made by mixing equal parts of turpentine, vinegar, and paraffin oil. This formula was given us by a man who worked for a piano company. He said they used this to finish off their best instruments.

This oil or floor wax will cover small scratches and mars, but if you have a badly scratched piece of furniture it is usually necessary to have the whole surface sandpapered and then finished again.

### Diary of a Western Boy in Europe (Continued).

By William E. Smythe, Jr.

GREY DAWN AND PARIS.

"AND you, Monsieur—you are American?" This from a lady beside me. I turned to find a middle-aged person looking at me with a quizzical smile. I answered: "Yes; but how did you know?"

"Oh, anybody would know," she returned. Then she opened her bag, took out a package of cigarettes and offered me one; but, as I don't smoke, she lit one herself and proceeded to tell me her troubles. She began by saying she was "English, thank God." And then went on to run down the people of Holland and Belgium. She had a "grouch on" with all the world, and I didn't think much of her until she began to tell me her more personal troubles, which certainly excused anything else she might have said.

She told how she had lost her husband, two sons, and a daughter in the Great War, and that she was now working as an agent for a British drygoods company on the Continent, and waiting to join her dear ones in the Great Beyond.

Next she asked me to what station we would have to go in Brussels to get the Paris train. I was very much surprised to find we would have to change cars, and told her so. She said: "How calmly you take it. I shall be terribly nervous until we are safely on board that Paris train; because we will have to cross the city, and if we miss the train we will have to sleep in the station; everything is full."

"What's the difference whether we sleep in the station in Brussels or the one in Paris?" I asked. "Aren't the hotels just as full there?"

"Why, you don't mean to say you expected to get to Paris to-night, do you?"

"I hadn't really thought of it," I said, "I only knew that this train was bound for Paris."

"Oh, if I could only be as irresponsible as that and not think," she sighed.

But now the lights of the great city were flashing by our windows and we knew we were coming into Brussels. The train pulled into a well-lighted depot; we alighted and set out for the other station, which we learned could be reached by a direct car. The lady pointed to the electric signs, the crowded streets, the gay cafés, and said, bitterly: "Look at them! The gayest city in the world. 'Starving'—Bah!" I have often since recalled that scene and marveled that I should have felt as much at home there as on my native streets in San Diego, but so I did.

We found the Paris train without much difficulty, and were soon ensconced in one of the small compartments with several Frenchmen. We talked a while after the train pulled out, and I even conversed with one of the Frenchmen, but was too tired to figure it out long, so curled up in a corner of the seat and was soon fast asleep.

We were all awakened at the frontier to have our baggage examined, and then all slept again. I awoke to find it light, cold, and very foggy. I stepped out into the corridor and noted that the dim outlines of trees, telephone poles, and occasional stations could be seen; but all else was white blankness. I looked at my watch and found it to be 5.30, so I returned to my seat and to my doze. When I became fully conscious again I saw that the sun had struggled through the fog and houses were on all sides of us. My companions of the night were putting on coats and hats and getting ready to leave.

At 7 a. m. we came into "Le Gare du Nord" which is large and very beautiful on the outside. I said

"good-by" to my friend of the evening before and went in search of a cab. I got into an old hack after telling the driver my destination in the very best French I could muster. We drove out Rue de La Fayette for several blocks, then turned to the left through some narrow, winding streets, until we finally stopped at L'Hotel d'Antin, and I stepped wearily from the vehicle. I was told that there was no room, but after presenting my letter of introduction was informed that I could have a room on the top floor, but which would not be vacated until afternoon. Then the proprietor handed me a pack of letters which had been forwarded and I went in search of a park bench where I could read them. I walked up the Rue d' l'Opera until I came to a promising side street, where I turned to the right and found myself in the Garden of the Tuileries.

It was barely 8 o'clock, and the hurrying taxicabs were the only signs of life. The flowers struck me as the most brilliant and beautiful I had ever seen. I imagine this was largely due to the arrangement and color scheme. I sat down on the nearest bench and read my letters from home.

Afterwards I decided to stroll around and see as much as possible in a leisurely way before lunch. I turned back toward the Opera House and found myself on a narrow street which was practically lined with small cafés of various sorts. I strolled down this street awhile, and then turned sharply to the right and came upon a quaint old book shop, the windows of which were filled with war relics, just as they came from the trenches. Here I spent a very interesting hour, browsing among old books where a musty odor pervaded the atmosphere. After purchasing a few relics, I again turned toward my hotel, only to stumble on Brentano's, where, to my surprise, most of the clerks spoke English only—at least they couldn't understand my French. Here I bought views of Paris and the battle front. Then I returned to L'Hotel d'Antin, where I went to my room for a much-needed nap.

—L. L.

(To be continued.)

### HAY MARKETING ASSOCIATION, MILK RIVER PROJECT.

The hay growers in the vicinity of Harlem and Chinook are considering the formation of an association to market the hay crop, and contemplate taking in all the hay growers under the Milk River project—that is, from Lohman to Nashua. Hay marketing conditions this year were markedly different from those that obtained last year, when there was an acute shortage. On November 1 of this year there was no market for hay, although the growers were holding the crop at a price not over half that asked at the same date a year ago, with few buyers.

### COLUMBIA BASIN ALFALFA GROWERS' ASSOCIATION, UMATILLA PROJECT, OREGON.

THE Columbia Basin Alfalfa Growers' Association was organized on October 1, 1920, and the following officers were elected: President, A. L. Larson, Boardman, Oreg.; vice president, W. J. Dobler, Umatilla, Oreg.; secretary-treasurer, J. W. Campbell, Hermiston, Oreg. Board of directors: V. L. Kurtzner, Boardman; W. T. Roberts, Umatilla; Charles Powell, Irrigon; Eli Winsett, Hermiston.

The directors for the Columbia, Stanfield, Echo, and Butter Creek districts have not been appointed, but will probably be selected by the end of the year.

In this connection Mr. L. A. Hunt, county agent for Morrow County, has written to the Hermiston Herald, in part as follows, concerning the possibilities of this association:

In considering the production of hay, it is advisable to remember that hay is not a finished commodity, and that there are at least three parties to its final manufacture: first, the land; second, the labor; third, the feeder; and all must be considered.

The board of directors of the association can do much to standardize the kind of seed sown and fertilizer used, and by buying both cooperatively can save considerable money. Whether they will ultimately decide to incorporate for a small capital stock or not is yet to be determined, but in either case a lot of cooperative purchasing may be carried on in a few lines if found advisable.

In the marketing of hay the average farmer is severely handicapped. First, he is by training and occupation primarily a producer and is not every day whetting his wits against those of his neighbor as a bargainer, but primarily he is handicapped by the fear that he may not sell his hay soon enough to meet his just obligations, and in that event will have no intercessor between him and his creditors. The fact that hay has actually sold during the same week, within 10 miles of Hermiston at prices f. o. b. shipping point, varying as much as \$3 per ton is evidence enough of the need of some concerted effort to stabilize the market price. The average hay producer is seriously damaged by the sale of inferior hay upon the regular markets by one of his neighbors. An organization that would obtain \$2 more per ton would be worth while. The Yakima Association sold 50,000 tons at \$23 f. o. b.

Every ton of hay sold by the association should be labeled as to grade with the name of the association. Feeders will soon learn that they can depend upon graded product and call for it.

It is generally conceded that the local buyer should receive at least \$1 per ton for handling the hay. The association territory will market this season about 30,000 tons of hay. One man could market this to much better advantage than six men, and a good man can certainly be secured for much less than \$30,000.

Most of the dairy associations of the Willamette Valley purchase their hay and feed cooperatively, and if it pays them to buy why will it not pay to sell the same way?

The organization of hay marketing associations is by no means new. Yakima and Kennewick have



them; the farm bureaus of Klamath, Jackson, and Josephine Counties have incorporations that do this and they all have realized better hay prices than non-members.

Every farmer should know what his hay costs to raise per ton, but what is more important, the association should know what it costs to raise the average ton it offers for sale. It is all right for farmers to sell below cost if they want to, but it would, to say the least, be poor business for the association to sell hay at a loss and not know it. The individual farmer is the better able to adjust himself to the average of all by knowing what it costs the average man. Experience has proven the wisdom and necessity of an ironclad agreement which will both protect the association and the individual producer. Of course, there are several types. Marketing of any commodity without this has generally proven very unsatisfactory.

The Deschutes Valley Potato Growers' Association

conducted its business as an association for two years, but found it advisable to incorporate in order to secure a better financial standing. They loan some money on potatoes and sometimes intercede between the bank and the borrower in such a way that the organization agrees to turn over to the bank the proceeds of a sale or such portions as may be mutually agreed upon. In this way the bank is absolutely protected as far as the crop goes, as the association can guarantee to sell the crop and turn the proceeds over to the bank.

The association has not yet determined to what extent it will attempt to market hay, and can certainly be a success without attempting more than a few of the possibilities outlined above.

Its ultimate success will depend primarily upon the personnel of its management and then upon the fidelity and patience of its members. No new machine but requires some adjusting to get started.

## LAND HUNGER AND LAND LAWS.

### Utilization of the Undesirable.

By S. V. Proudfit, General Land Office.

WHEN the Cavaliers and Puritans began business in the New World they had no lands or land laws, but with the acquisition of a national existence the public domain was born, and gradually laws followed for its distribution. Our public land system has been the outgrowth of local necessities and conditions. This is true both with respect to agricultural and mineral lands. In the one case, settlement outran the surveys, slopped over into forbidden territory; and in the other, the search for gold recognized no Federal limitations. The simplest measures, calculated to meet present conditions, were adopted—cash or credit sales in the case of mineral lands, the recognition of local laws and customs. This paper, however, deals only with the appetite for agricultural lands, and the statutory provisions for its satisfaction.

#### CASH AND CREDIT SALES.

The acts of May 18, 1796, and May 10, 1800, authorizing the sales of public lands, contained a provision for credit on payment of a specific amount, with installments covering the balance due. This credit system was abolished by act of April 24, 1820 (3 Stat., 566), but during the time it was in force the Government parted with over 13,500,000 acres of land, distributed among eight different States, in which Ohio was the leading purchaser and Alabama the next in line.

By the act of March 2, 1889, private sales of public land, except in Missouri, were prohibited, and inasmuch as the policy of offering lands at public sale had prior thereto been gradually abandoned, this act may

be said to mark the end of cash sales as a general method of passing title to public lands.

#### PREEMPTION LAW.

Not until the preemption act of 1841 could it be said that future possibilities of national development were taken into consideration in the enactment of public land laws. Prior to that time there had been, it is true, now and then, a special preemption act authorizing the purchase of lands that had theretofore been settled upon prior to any legislation authorizing such appropriation. In fact, the preemption law was the outgrowth of the necessity for making some provision for the acquisition of a right by settlement; whereas the earlier preemption laws, in permitting the purchase, in effect condoned the prior trespass on the part of the settler. It must not be forgotten, however, that the preemption law was adopted with more or less difficulty, both along legislative and administrative lines. The Commissioner of the General Land Office in his annual report of December 3, 1830, has this to say about preemption:

The expediency of granting such privileges may well be questioned, when it leads to a course of speculation founded exclusively upon the gracious liberality of the Government, inconsistent with the business interest. In some cases the occupants dispose of the advantages thus acquired by law to less fortunate individuals at a profitable advance with a view of making a settlement elsewhere, in anticipation of similar speculation at a future date. It is, therefore, respectfully suggested, as a better policy, to progress with the public surveys in all the States in organized Territories in which the unsurveyed public domain is situated as rapidly as can be done with propriety and accuracy, and bring the lands into market as soon as convenience will permit, leav-

ing intruders and trespassers to the local tribunals of justice for such relief as they may be entitled to on any principle of legal right or equitable jurisdiction.

The preemption law as it finally stood gave the right of purchase to the settler, whereas in the case of the earlier cash sales it was questionable whether settlement would follow or the lands be held for speculative advance in price. The preemption act of 1841 was repealed March 3, 1891, but from the date of its passage down to the time of its repeal it was the principal means by which small tracts of land were acquired under settlement rights, and whatever may be said about the imperfections of this act it was largely through its instrumentality that settlement rights as such came to be a recognized principle of public land law. Through cash and credit sales of public lands, sales under the preemption law, the actual acreage of which can not be given, and the location of military bounty land warrants embracing 60,000,000 acres, the eastern fringe of the Middle West, as it is now styled came into its own—Ohio in 1807, Indiana in 1816, Michigan in 1837 Iowa in 1846, leaving the parent States to marvel at the growth of their children.

#### GRADUATION ACT.

In the history of public legislation, and as the outgrowth of cash sales, the graduation act of August 1, 1854, "to cheapen the price of lands long in market for the benefit of actual settlers, and for adjoining farms," should not be overlooked. It graduated the price of public lands which had been in market, varying from \$1 to 12½ cents per acre, according to the length of time the respective tracts were on the market. The act was repealed June 2, 1862 and during the time it was in operation the sales reported were 25,696,419 acres.

#### DONATION LAWS.

As a modification of the preemption plan several donation laws were enacted, notably the act of September 27, 1850, known as the "Oregon donation act," under which some 2,500,000 acres were disposed of in the Territory of Oregon. This act had many features in common with the preemption law, but the original provisions were materially modified by later legislation.

#### HOMESTEAD LAW.

Notwithstanding the successful operation of the preemption law, it was apparent that the problem of how we should best use our great heritage of public lands still remained an open question, and not until the home was made the unit of development and citizenship a prerequisite, by the enactment of the homestead law in 1862, did we find a satisfactory solution. By this act and its amendments distinctions disappeared before the settler lands offered or unoffered, surveyed or unsurveyed, all were equally

open to him. True it is, that the preemption law and the homestead law were in full operation for many years side by side. Indeed, it may be said that the homestead law was grafted upon the preemption scheme, in so far as it recognized settlement as the basis for the acquisition of title. During this period the settlement of the Dakotas illustrates, in a high degree, the efficiency of the two laws taken together in the development of the agricultural possibilities of our public domain. As the States of Indiana, Illinois, and Iowa represent the overflow of farm hunters from New York, Pennsylvania, and Ohio, so do the Dakotas stand for a similar influx, especially from the States of Iowa and Illinois. Some portions of Illinois and Iowa lost heavily in population owing to the farm emigration to the Dakotas. Of course these people sold their improved farms to purchasers from farther east, to the end that they might take advantage of the several public-land laws then in operation, especially the homestead, preemption, and timber-culture law, the latter an act first passed in 1873, afterwards modified in 1878, by which title to 160 acres could be secured through the planting and cultivation of 10 acres of timber. But in 1891 the preemption law was repealed as well as the timber-culture law. It was believed that the preemption law had served its primary purpose and that its better features were embodied in the homestead law; the timber-culture law had proved in some degree unsatisfactory, although it may be said in passing that over 5,500,000 acres of land were entered under its provisions.

A marvelous exhibition of land hunger was given in the Oklahoma opening of 1889, wherein the unappropriated lands were made subject to disposition to actual settlers under the homestead laws as well as the town-site laws. These lands, over 2,000,000 acres, had formerly been embraced within an Indian reservation and were afterwards ceded to the United States, but until the passage of the act of March 2, 1889 (25 Stat., 1004), they were not open to disposition, although repeated efforts had been made to take possession of the lands and settle thereon, which were only prevented by the use of the military. The story of this opening, the manner in which it was conducted, the unparalleled rush of would-be settlers for the lands opened, and the establishment of town sites is of too great length to include in an article of this character. The case of the Town Site of Kingfisher v. Wood et al. (11 L. D., 330) contains a very excellent recitation of the facts and circumstances attendant upon this opening. The lands were opened to settlement at noon on the 22d day of April, 1889. Persons entering prior thereto, afterwards known as "sooners," forfeited all future claim or acquisition of right to any of such lands. The moment of lawful entry was announced by firing cannon at different



points on the border, and the race was then on—for race it was—by foot, horseback, and team, and the result not always to the swiftest. One man, riding a racer that had been trained for days previous to the opening, on arriving at the tract desired found a man plowing with a yoke of oxen; another, whose horse stepped into a gopher hole, went over his horse's head and "settled"—he liked the situation so much he stayed there and proved up. In many cases rival racers appeared upon the same tract, priority of right only to be determined after litigation. "A horse race in which the judges saw neither the start nor the finish." At Guthrie, one of the new land offices opened in the Territory, the only inhabitants in the morning were the officials of the district land office; at night 7,000 persons were there, who proceeded to lay out and organize a town, which, by the way, stayed on the map and now rates 12,000 population.

The opening of the Cherokee Outlet, embracing some 6,500,000 acres, which occurred September 16, 1893, in pursuance of the act of March 3, 1893 (27 Stat., 612), was the last great horse race for public lands. The Outlet was divided into four land districts, and land offices were established at Perry, Enid, Alva, and Woodward. The penalty for entering upon these lands prior to the hour of opening was similar to that provided in the first opening. A neutral strip, 100 feet in width, about the Outlet, was declared for the convenience of those who might desire to take part on the first day of the opening, and booths were established at different points within the strip where intending settlers were required to appear and make a declaration showing their qualifications as settlers, the possession of this certificate being a prerequisite to assertion of rights thereafter. About 115,000 certificates of this character were issued, and the race that followed the opening was only mildly typified by the conditions attendant upon the first opening of Oklahoma lands. Within a few minutes after the hour of opening lines were formed before each of the district land offices, and those at Perry, Enid, and Alva rapidly grew in length by the arrival of applicants, until there were over 5,000 people in line at each of those places waiting to make homestead entry. The entries allowed under this opening aggregated fully one-sixth of all entries elsewhere in our public-land States during 1893.

#### REGISTRATION AND DRAWING.

The experience of both the Land Department and intending settlers in the Oklahoma openings noted herein had been so extremely unsatisfactory in the resulting conflicts and expense and long-drawn-out litigation that the adoption of some new method of opening public lands to entry seemed absolutely necessary. Consequently Congress, by the act of 1901, in providing for the opening of the lands ceded to the United States by the Wichita, Comanche, Kiowa, and

Apache Tribes of Indians, directed the lands to be opened by proclamation of the President.

And to avoid the contests and conflicting claims which have heretofore resulted from opening similar public lands to settlement and entry, the President's proclamation shall prescribe the manner in which these lands may be settled upon, occupied, and entered by persons entitled thereto under the acts ratifying said agreements, respectively; and no persons shall be permitted to settle upon, occupy, or enter any of said lands except as prescribed in such proclamation until after the expiration of sixty days from the time when the same are open to settlement and entry.

No little publicity was given to this direction by the Land Department, inviting suggestions for plans of opening by which the evils attendant upon the older scheme might be avoided and yet a fair distribution of the land amongst applicants secured. As a result of this course a great many suggestions were filed in the General Land Office and taken into consideration when the regulations were formulated in the Secretary's office.

The plan finally adopted provided for the registration of all applicants for the right of entry at a specific time and place in the immediate vicinity of the lands, with a drawing thereafter by which the right of entry would be determined.

The lands embraced in this opening were subdivided into three counties, and two new land offices, one at El Reno and one at Lawton, were established in order to properly handle the disposition of lands. Some 2,280,000 acres were opened to entry under this plan, for which 164,416 applicants registered. The proportion of applicants to the amount of land opened can be better appreciated when it is known that 13,000 entries of 160 acres each would have exhausted the entire amount of land opened.

A peculiar feature of this opening was found in a provision of law authorizing the setting apart of a tract of 160 acres for a county seat in each one of these three counties, town lots therein to be sold at public auction to the highest bidder for the benefit of the respective counties. This provision was fully carried out during the period of the opening, by which the sum of \$730,201.85 was realized for the three counties.

The story of this opening—the successful operation of the plan, the absence of the turbulent assertion of alleged rights characteristic of former openings—is well told in a special report, illustrated with maps and photographs submitted by Assistant Commissioner Richards under date of October 9, 1901. The report concludes:

It is believed that the intent and purpose of the acts of Congress and of the proclamation have been fully carried out. There has been no complaint of discrimination or of unfairness, and there were but little of hardship and suffering usually encountered in a settlement of a new country. Without strife or contention, but in a quiet, peaceful, and orderly manner these lands have passed from the condition of an Indian reservation to that of a populous, thrifty, peaceable, agricultural community.

From this time forward our larger openings of public lands followed the above plan with marked success, with improvements from time to time in methods of procedure by which its operations were largely simplified and more easily administered. In the case of the Rosebud Indian lands 385,817 acres, which would have provided approximately 2,412 homestead entries of 160 acres each, were opened to entry in August, 1904, by registered applicants, for which there were 106,308 registrants; the proportion of land seekers to land still holding as good as theretofore.

From 1905 to 1916, inclusive, there were 15 openings of public lands by registration and drawing, the total number of registrants during that period amounting to 783,412.

#### PRESENT PLAN OF OPENING.

Opening by registration and drawing was peculiarly adapted to cases where large bodies of desirable lands were to be offered to settlement and entry; but where the areas were not so large, or were of diversified character, and not likely to invite a rush of settler claimants, especially in cases of restorations from withdrawal, or filing of township plats of survey, some modification of that scheme seemed advisable; so Congress, by act of September 30, 1913 (38 Stat., 113), authorized the opening of such lands by settlement in advance of entry, by drawing, or such other method as might be deemed advisable "in the interest of equal opportunity and good administration." Under this law a new plan of opening was formulated providing, in effect, for applications to enter prior to the date of opening, when all applications would be treated as simultaneous, those not in conflict allowed, and a drawing had in cases of conflict to settle priority of right.

#### UTILIZATION OF THE UNDESIRABLE.

Our immense areas of public land that were only awaiting the plow and reaper for a long period served to supply the demand for agricultural uses, but the time came when it was apparent that some inducement should be offered for the settlement and development of lands less well adapted to the immediate purposes of the farmer. Notably was this true in the case of lands that were unproductive under existing conditions for the want of a sufficient water supply, but that if properly irrigated were even more productive than the most fertile prairie land. The first practical application of this conception is found in the Lassen County, Calif., act, March 3, 1875 (18 Stat., 497), which authorized entries of desert lands in that county, on condition that reclamation was shown by conducting water upon the land and the payment of \$1.25 per acre. Two years later the general desert-land act applicable to specified States containing arid lands, was enacted, which was ulti-

mately amended by the act of March 3, 1891 (26 Stat., 1095). The conditions under which such entries were allowed were largely modified by the later legislation but the principle remained the same—the reclamation of arid public land through irrigation by private enterprise.

From the passage of the act of 1877 to the end of the last fiscal year (June 30, 1920), there had been patented under the desert-land law 8,031,426 acres, a substantial testimonial to the practical character of this line of legislation.

#### THE CAREY ACT.

From the ready response given the desert land act by private enterprise it was apparent that if larger capital could be employed the transportation of water in quantities sufficient for the reclamation of larger units would be equally practicable, and on this basis the act of August 18, 1894 (28 Stat., 422), was predicated, whereby the Secretary of the Interior, with the approval of the President, was authorized to enter into contracts with certain States having arid lands, to patent to each of them not to exceed 1,000,000 acres of such lands "as the State may cause to be irrigated, reclaimed, occupied, and not less than 20 acres of each 160-acre tract to be cultivated by actual settlers." The later amendments of the act do not affect the underlying principle upon which it is founded, and although operations under the act have encountered administrative difficulties and have been carried on in the several States with varying success, the soundness of the scheme has been unquestionably demonstrated. The irrigation and development of arid public lands through the instrumentality of the States within which such lands are situated, commends itself at once as a sound, economic movement on the part of both the State and the Federal Government. Up to the present time there have been patented under this act 889,000 acres of land and many projects under the act are at the present time under active prosecution that will doubtless be worked out to a successful conclusion.

#### FEDERAL RECLAMATION OF ARID LANDS.

In the story of the redemption of the desert the central figure is the National Government in whatever method has been adopted. In the desert-land law it gave recognition to private enterprise as a basic principle; in the Carey Act, development of the State, but in neither was the Government an active participant in the work of redemption. National irrigation, however, had for a long time been contemplated by the pioneers in this field as one of the Federal burdens that should be assumed if the substantial sources of national wealth were to be made fully productive. October 2, 1888 (25 Stat., 526), an act was passed appropriating \$100,000 for the purpose of investigating the extent to which the arid



region of the United States could be redeemed by irrigation and reserving the lands that were designated or selected under such investigation as sites for reservoirs, ditches, or canals for irrigation purposes and "all the lands made susceptible of irrigation" by such reservoirs and canals. This was followed by the act of August 30, 1890 (26 Stat., 391), providing for a reservation in all patents issued for lands west of the one hundredth meridian of a right of way for ditches or canals constructed by authority of the United States. Thus was the statutory foundation laid for the reclamation act of June 17, 1902 (32 Stat., 388), in which were crystallized the results of many years' study and investigation, and that stands to-day a national monument to the foresight and courage of the men that stood back of the act of 1888. Since the passage of the reclamation act an irrigation system has been provided for 1,636,000 acres of land on the reclamation projects proper and covered by the annual crop census, with an available supplemental supply of water for an additional million and a half acres embraced in the present projects on completion. Forty thousand families are in independent homes with present annual crop returns of the value of nearly \$90,000,000. In addition, approximately 1,000,000 acres of land under private systems and not covered by the project crop census are served with water under the Warren Act from the works of the Reclamation Service producing crops in 1919 amounting in value to \$64,000,000.

But, returning to the "utilization of the undesirable" and illustrations of true land hunger, the record of the opening in the North Platte project last March compares well even with the rush and horse race of former days. For 80 farm units there were 3,298 applicants; in some cases as many as 200 applications for one farm unit.

The public sale in December, 1919, of the lands in the First Mesa unit of the auxiliary to the Yuma reclamation project, Arizona, is a still more notable example of the extraordinary recognition on the part of the agricultural world given to the values resulting from the union of land and water under Federal supervision. The acts of June 25, 1917 (39 Stat. 868), and February 11, 1918 (40 Stat., 437), authorized the creation of this auxiliary project and the sale of the lands therein together with appurtenant water rights. The farm units ran from 5 to 20 acres, and at the sale some 5,000 acres were sold to 518 purchasers at an average of \$230 per acre, or \$1,383,396.40 for the combined value of the land and water rights. It should be remembered that these lands without water are in the last degree typical unproductive southwestern desert lands, but that with water their potential value, lying as they do in the citrus and cotton belt justifies the price that was paid at this sale. The scheme thus inaugurated under these acts provides a new plan of financing reclamation projects without

calling on the National Government for the advancement of funds, while the purchaser has the guaranty of the Government for the ultimate water supply.

#### SEMIARID LANDS.

In the study of our available productive acreage it was apparent that large areas of semiarid lands were outside the reach of practicable irrigation, but that if the homestead unit was enlarged and these lands were handled under modern dry-farming methods, in connection with grazing, excellent results might be obtained.

This conception found its first expression in the Kinkaid Act of April 28, 1904 (33 Stat., 547), which was applicable only to the western portion of Nebraska, to lands that were not "reasonably practicable to irrigate under the national irrigation law or by private enterprise." In the first 10 years after the passage of this act there were patented under its provisions 6,726,516 acres.

The next legislative recognition of this principle was embodied in what is known as the "enlarged homestead" act of February 19, 1909 (35 Stat., 639), which provided for an entry of 320 acres of agricultural nonirrigable lands of this character, on condition that the Secretary should first designate lands subject to such appropriation as not "susceptible of irrigation at a reasonable cost from any known source of water supply." Under this act and the several amendments thereto there have been patented during the fiscal years 1915 to 1920, inclusive, 29,502,908 acres.

The marked success that attended the enlargement of the homestead unit for lands of semiarid character in the case of the Kinkaid and the enlarged homestead acts led to the passage on December 29, 1916, of the stock-raising homestead law (39 Stat., 862). By this act the Secretary of the Interior is authorized to designate as stock-raising lands subject to entry lands the surface of which is in his opinion chiefly valuable for grazing and raising forage crops, that do not contain merchantable timber, are not susceptible of irrigation from any known source of water supply, and are of such character that 640 acres are reasonably required for the support of a family.

Up to the close of the present fiscal year the records of the General Land Office show that more than 36,000 stock-raising homesteads have been allowed, while the Geological Survey reports that a total of 82,000 petitions for designation have been received and that 67,000 of such petitions have been acted upon, and a total area designated as subject to entry under said act of 74,000,000 acres, which means that in the very near future the present number of entries allowed will be more than doubled and we will have some 30,000,000 acres of land appropriated under the stock-raising homestead act.

## FURTHER FIELDS OF ACTION.

The "utilization of the undesirable" will find still further fields for action in (1) the reclamation of swamp lands that have thus far been awaiting their turn in recognition of the greater call for the redemption of our arid lands; and (2) in removal of the stumps from "cut-over" lands.

A movement in the direction of the first proposition of much significance is found in the Volstead Act of May 20, 1908 (35 Stat., 169), by which the United States has permitted the State of Minnesota to treat the public swamp lands in that State as fully subject to the State drainage laws, with a scheme for the disposition of such lands without settlement or residence where default is made in the payment of the drainage taxes imposed by the State. Some time necessarily elapsed after the passage of the act before its provisions could fairly be put into effective operation, but a practical demonstration of its success is found in the fact that we have patented under this act up to the present time some 927,240 acres of land, which may be recognized now as one of the productive units in our agricultural possibilities.

It will be observed that by the Volstead Act the reclamation of the Federal swamp lands is effected through the operation of the State drainage laws, without the expenditure of any public funds, a feature that is not to be overlooked when there are so many calls upon the National Treasury.

The marked success of the Volstead scheme has thus far resulted in at least two applications of the same principle: (1) The act of August 11, 1916 (39 Stat., 506), to promote the reclamation of arid lands, which subjects the public arid lands that may be embraced within a State irrigation district to the laws of the State the same as lands in private ownership; and (2) the act of January 17, 1920 (Public 119), authorizing local drainage districts to drain certain public swamp lands in Mississippi and Poinsett Counties, Ark., and to subject said lands to taxation to the same extent and under the same conditions as privately owned lands are taxable for drainage purposes.

The reduction of "cut-over" timber lands to such a condition of agricultural possibility as to invite the attention of the farmer and homeseeker has been given no little consideration during the last few years, but thus far no affirmative legislative action has been taken looking toward the accomplishment of this purpose. One reason for hesitation in taking up this project has been found in the proposition that the United States, in order to engage in this work, would of necessity have to acquire such lands by purchase or its equivalent from the present private owners. This reason, however, disappears when we remember that the United States is now the owner, through the revestment acts of June 9, 1916 (39 Stat., 218), and

February 26, 1919 (40 Stat., 197), of magnificent bodies of timberland embraced in the former grants to the Oregon & California Railroad Co. and the Coos Bay Wagon Road Co., from which, under the provisions of these statutes, the timber will be sold and the land opened to homestead entry without charge after the removal of the timber therefrom. The tremendous task, however, of fitting such lands as these for cultivation will make it necessary for the Government to offer some additional inducement to the agriculturist if we secure the addition of these lands to our productive resources and relieve them from the special "fire risk" that always follows the removal of timber. Of course, this means additional legislation, but we have ample time in which to look into this matter carefully and convert this liability into one of our most valuable assets.

## C. E. PIATT ASSUMES NEW DUTIES.

C. E. Piatt, examiner of accounts for the southern district, has been granted a six months' leave of absence without pay, beginning November 17, 1920. Mr. Piatt has accepted a responsible position at Calexico, Calif., with the Imperial Irrigation District. He was transferred from the Philippine Service in September, 1910, serving in various capacities in the Washington office and on the Flathead, Sun River, and Shoshone projects. In 1917 he was promoted from the position of chief clerk on the Shoshone project to that of examiner of accounts. His experience during these 10 years of service has eminently qualified him for a position of larger responsibility, and the best wishes of his friends in the Service go with him to his new duties.

He is succeeded by H. N. Bickel, chief clerk on the Flathead project.

I have a very high regard for the RECLAMATION RECORD and would like very much to receive it each month.—*H. S. Looper, Lovell, Wyo.*

"I suppose your motto is 'Make hay while the sun shines,'" remarked the summer boarder who tried to be genial.

"It used to be," answered the farmer. "But lately I have been a little bit careful not to mention sunshine for fear the hired man would insist on having extra help to hold an umbrella over him while he worked."—*Washington Star.*

I am a water user on the Minidoka project. The RECLAMATION RECORD is valuable. I would be pleased to have it continued.—*E. M. Miles, Rupert, Idaho.*



# The Reclamation Record.

Issued monthly by the Reclamation Service, Department of the Interior, under the authority of the Secretary of the Interior.

Copies of the RECLAMATION RECORD will be sent free of charge to any water user on our reclamation projects. The subscription price to others is 50 cents a year (75 cents a year on and after Jan. 1, 1921), payable in advance. Subscriptions may be forwarded to the chief clerk, United States Reclamation Service, Washington, D. C., and remittances (postal money order or New York draft) should be made payable to the special fiscal agent, United States Reclamation Service. Postage stamps will not be accepted.

Material for publication in the RECLAMATION RECORD should be addressed to *Editor RECLAMATION RECORD*, United States Reclamation Service, Washington, D. C., and should be mailed in time to reach the editor not later than the 15th of the month, in order to insure publication in the succeeding month's issue of the RECORD.

HUGH A. BROWN, EDITOR.

## SUBSCRIPTION BLANK.

### Reclamation Record.

[To be used only by persons who are NOT water users on the projects of the U. S. Reclamation Service.]

CHIEF CLERK,

U. S. Reclamation Service,  
Washington, D. C.

DEAR SIR: I am NOT a water user on one of the projects of the U. S. Reclamation Service, but wish to receive the RECLAMATION RECORD each month.

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## OCTOBER WEATHER IN THE WESTERN STATES.

By P. C. Day, United States Weather Bureau.

October in the Western States averaged cooler and wetter than usual, but different districts showed unusual contrasts in their weather conditions, and there were great changes from the early part of the month to the latter part. The opening week was mainly warm, particularly in the more northern States from Idaho eastward; but by the middle of the month it was cold in most of the West, and generally continued so, especially in Utah and Arizona, and portions of the States adjoining. The whole month averaged about as warm as normal or slightly warmer in Pacific coast districts and near the Rocky Mountain Divide; but decidedly cooler in the regions between, while considerably warmer to eastward of the Rockies. From the Texas Panhandle to eastern Montana and western North Dakota the excess was about 5° per day.

During the first third of October important rains occurred west of the Cascade-Sierra crest, but not in southern California, and some rain came about the 10th in southern Idaho and adjacent sections. Around the middle of the month there were rains in the northern half of the country west of the Rocky Mountain Divide. The latter part of the month brought precipitation of importance in Utah and northern Arizona and nearly everywhere in the Rocky Mountain and Plains States, but scarcely any in most districts near the Canadian border; there was unusually heavy snow for so early in the cold season over large portions of Wyoming and some parts of States adjacent. The monthly totals of precipitation were large in much of western Oklahoma and southwestern Kansas and near-by districts, and over a considerable area to eastward and northward of Great Salt Lake; also Idaho and northern Arizona had, in general, heavy rainfall. The month had less rain than normal, however, in some parts of the West, as western Nevada, northeastern Washington, large portions of Montana and North Dakota, and most districts close to the Mexican border. For most of the West the month was wetter than usual.

The month was mainly favorable for fruit, though there was some delay in harvesting in the far Northwest, owing to rains. Sugar beets, potatoes, and other crops could not be harvested as well as usual in many districts, owing to rain and snow, and a little frost damage to late truck was reported. The weather generally favored fall grains, especially the early sown. In portions of the Plains early in the month ranges were poor, owing to dryness, and late in the month deep snow covered some ranges, particularly in Wyoming; but mainly ranges were in fine shape and live stock did well.

## IRRIGATION STATISTICS, FOURTEENTH CENSUS.

The Director of the Census announces, subject to correction, the following preliminary statistics on irrigation for the counties named. Similar statements for

other countries will be issued as soon as the figures are available and will be published from time to time in the RECLAMATION RECORD.

*Irrigation by counties, 1920 and 1910.*

State and county	Average to be irrigated by works either completed or under construction			Average to which existing works are capable of supplying water			Average irrigated			Average available for settlement in 1920
	1920	1910	Increase. <sup>1</sup>	1920	1910	Increase. <sup>1</sup>	1919	1909	Increase. <sup>1</sup>	
<b>Colorado</b>										
Archuleta.....	18,188	21,812	- 6,624	13,289	22,230	- 9,941	11,933	15,008	3,075	
Baca.....	12,599	959	11,541	12,020	351	11,669	2,287	211	2,076	
Conejos.....	206,519			151,346			138,474			1,500
Costilla.....	192,960			43,966			36,771			4,000
Delta.....	156,624	174,830	- 18,206	109,669	99,484	10,484	93,508	62,111	31,097	20,080
Dolores.....	23,691	2,052	21,549	2,364	2,042	319	1,034	1,149	116	
Douglas.....	11,789	25,105	-13,616	7,781	24,624	-16,843	6,036	13,768	7,732	
Eagle.....	17,531	32,925	-14,606	30,628	28,116	2,512	29,620	27,578	7,042	
Elbert.....	6,580	20,361	-13,781	1,690	11,886	-9,396	1,175	7,628	6,453	1,800
Grand.....	85,171	98,299	-12,825	43,092	77,672	-34,580	39,857	42,194	2,337	800
Gunnison.....	67,965	73,895	- 5,990	52,117	79,700	- 27,583	18,330	55,848	37,518	
Hinsdale.....	1,095	5,220	- 4,125	5,880	3,354	2,526	3,675	2,924	751	
Huerfano.....	13,051	66,878	-53,827	31,599	35,690	- 4,091	28,781	97,598	68,817	2,725
Jackson.....	228,403	244,967	-16,564	148,325	199,457	-50,932	136,142	151,850	15,708	27,640
Lake.....	8,443	16,380	- 7,937	5,452	11,647	- 6,195	4,761	10,967	- 6,206	
Logan.....	124,417	87,301	37,114	105,916	65,345	40,571	85,079	63,166	21,913	
Montezuma.....	72,916	67,538	12,378	44,795	62,757	-17,962	14,083	27,176	16,907	13,000
Montrose.....	163,262	251,132	-90,870	101,645	92,194	9,451	89,897	55,993	33,904	16,500
Morgan.....	166,670	259,590	-92,920	153,796	114,933	38,863	132,231	97,849	34,382	
Ourray.....	24,057			23,082			14,088			
Pitkin.....	21,195	39,497	-18,302	15,172	29,719	-14,547	12,994	15,152	2,158	
Rio Grande.....	293,611	553,637	-60,026	227,167	298,021	-70,854	206,258	107,551	98,707	
Saguache.....	271,933	157,568	114,365	153,891	150,943	2,947	137,581	145,871	- 8,290	8,000
San Miguel.....	231,949			27,211			15,774			10,000
Sedgwick.....	24,050	53,620	-29,570	23,050	23,260	- 210	21,510	22,023	- 513	
Summit.....	14,522	16,489	- 1,967	10,426	11,739	- 1,313	9,351	8,402	949	
Teller.....	1,994	1,664	240	1,500	1,435	65	1,424	1,370	54	
Yuma.....	15,242	8,275	6,967	10,182	6,290	3,893	8,254	3,890	4,364	
Washington.....	10,095	7,969	2,126	10,095	6,027	4,068	9,335	5,595	3,740	
<b>Idaho</b>										
Ada.....	131,800	147,330	-12,440	131,768	87,511	44,257	117,493	86,494	30,999	3,300
Bannock.....	227,586	156,037	71,549	185,316	112,288	73,028	137,266	86,645	50,621	16,000
Bear Lake.....	83,890	74,427	9,463	72,823	59,829	13,074	67,202	58,731	8,471	
Blaine.....	97,786			77,501			52,260			1,000
Bonneville.....	135,021			123,043			110,953			
Camas.....	21,284			14,516			13,272			
Caribou.....	29,102			25,908			23,805			
Custer.....	135,285	75,788	59,497	103,473	54,505	48,968	72,615	41,889	30,726	1,675
Elmore.....	60,112			37,591			28,844			2,386
Gem.....	58,727			74,836			50,267			
Kootenai.....	10,214			5,495			4,000			
Nez Perce.....	6,135			5,901			5,018			
Teton.....	62,338			57,547			41,335			
<b>Montana</b>										
Beaverhead.....	503,894			375,311			293,419			2,200
Blaine.....	189,452			90,102			58,517			18,157
Deer Lodge.....	41,407			24,151			13,241			641
Gallatin.....	263,879			170,050			99,262			15,281
Granite.....	64,457	33,916	30,541	44,957	28,350	16,607	37,469	24,107	13,362	
Howell.....	125,087			85,245			56,775			780
Ravalli.....	144,343	202,296	-57,953	127,357	118,984	8,373	107,351	93,441	13,910	
Sheridan.....	14,499			8,627			2,369			
Silver Bow.....	16,676			11,981			8,120			
Sweetgrass.....	146,265			78,711			44,306			10,080
Valley.....	92,443			22,378			20,072			18,848
Yellowstone.....	110,290			98,406			76,378			3,317
<b>Texas</b>										
Cameron.....	178,423	156,349	22,074	120,957	115,363	5,594	60,107	29,439	30,668	50,868
Hidalgo.....	424,538	222,569	201,969	388,538	71,327	317,211	160,532	21,048	139,484	21,000

<sup>1</sup> A minus sign (-) denotes decrease.

<sup>2</sup> To be supplied with water by works either completed or under construction.

<sup>3</sup> Boundaries changed since 1910, hence no comparative figures can be given.

<sup>4</sup> Organized since 1910; hence comparative figures for 1910 can not be given.

The average farmer of to-day has all the modern equipment for his farm, but the average farm woman still carries water from the well. Why not pipe it into the house for her?

Vacationist: "You say the city takes everything you raise?"

Farmer: "Yes; and that includes the help we raise."—*Northwestern Stockman and Farmer*.



## ENGINEERING INVESTIGATIONS.

## Program to be Undertaken During the Fiscal Year 1921.

By J. L. Savage, Designing Engineer, United States Reclamation Service.

IN the March, 1915, RECLAMATION RECORD, appeared the first published announcement of plans that had been made to undertake certain engineering investigations in connection with the operation of existing works of the Reclamation Service, and an outline was given of the work then considered desirable. The object of these investigations has been the experimental determination of certain factors and elements regarding which little had heretofore been known, thus permitting the more economical design of irrigation works by the engineers of the Service. Much valuable work in this line has been accomplished since that date as a reference to the files of the RECLAMATION RECORD and the published data cards will demonstrate.

Owing to the lack of sufficient engineering personnel on the various projects, practically all engineering investigation work was discontinued during the period of the war and for some time thereafter. At the suggestion of the Director, it was decided to resume this work during the fiscal year 1921, and the writer was instructed to prepare a program of such work. A small allotment (\$3,000) was made from the secondary project fund for engineering investigation work to be done during the fiscal year 1921.

In order to obtain the greatest benefit from this limited allotment, it was necessary to make a careful survey of the experimental work which had been completed, and such work still pending, in addition to a careful study of data most urgently needed.

The completed work includes all the material that has been published under this caption in the RECLAMATION RECORD to date and has been summarized on 35 data cards, as follows:

## COMPLETED DATA CARDS.

1. Seepage losses from canals, Minidoka project.
2. Seepage losses from canals, Carlsbad project.
3. Kutter's  $n$ , Minidoka project; Earth channels.
4. Head lost and recovered, Happy Canyon Flume, Uncompahgre project.
5. Stilling basins and chutes, Boise project.
6. Siphon spillways, Yuma project.
7. Friction bronze on bronze; slide gates, Arrowrock Dam.
8. Overflow, Three-mile Falls diversion dam, Umatilla project.
9. Coefficient of discharge, Maxwell Canal head gates, Umatilla project.
10. Settlement of Belle Fourche Dam.
11. Intake and outlet losses, Hope Creek Flume, North Platte project.
12. Siphon losses, Wet Spotted Tail Creek Siphon, North Platte project.
13. Siphon losses, Dry Spotted Tail Creek Siphon, North Platte project.
14. Notch drops, Lateral 24 M, North Platte project.
15. Notch drops, Lateral 21 M, North Platte project.
16. Kutter's  $n$  for metal flumes, North Platte project.
17. Kutter's  $n$  for metal flumes, North Platte project.
18. Metal sheets in alkali soils, Belle Fourche project.
19. Wave heights, Belle Fourche Reservoir.
20. Friction of bronze on bronze; slide gates, Elephant Butte Dam.
21. Friction of bronze on bronze; slide gates, Pathfinder Dam.
22. Discharge curve for notched drop, Mora Canal, Boise project.
23. Notched drop, Mora Canal, Boise project.
24. Kutter's  $n$  for metal flumes, Uncompahgre project.
25. Kutter's  $n$  for concrete lined canals, Uncompahgre project.
26. Metal sheets in alkali soil, Uncompahgre project.
27. Metal sheets in alkali soil, Sun River project.
28. Transition losses in concrete-lined canals, Okanogan project.
29. Intake and outlet losses; steel flume, Okanogan project.

30. Kutter's  $n$  for concrete-lined canals, Carlsbad project.
31. Kutter's  $n$  for concrete-lined canals, Yakima project.
32. Recovery of head, Tieton Main Canal, tunnel outlets, Yakima project.
33. Kutter's  $n$ , Tieton Main Canal, Yakima project.
34. Metal sheets in alkali soil, Sun River project.
35. Sag in metal flumes, North Platte project.
36. Kutter's  $n$  for metal flume, Huntley project.

After careful consideration, it was decided that experimentation should be continued on the following:

## EXPERIMENTS TO BE CONTINUED.

- (a) Seepage losses from canals.
- (b) Value of Kutter's  $n$  for concrete channels.
- (c) Transition losses in open canals.
- (d) Flow in chutes and disturbances in stilling basins.
- (e) Discharge coefficient for siphon spillways.
- (f) Friction coefficients for gate leaves and bronze seats.
- (g) Coefficient of discharge for overflow dams.
- (h) Discharge coefficient through head gates.
- (i) Effect of alkali on concrete.

In addition to the experimental investigations to be continued, consideration has also been given to other data which are more or less urgently needed. Following is a summary of experimental data which should ultimately be obtained:

## EXPERIMENTAL DATA NEEDED.

1. Value of Kutter's  $n$  in concrete pipes:
  - (a) Monolithic pipe.
  - (b) Precast pipe.
2. Curve losses in pipes:
  - (a) Wood-stave pipe.
  - (b) Monolithic concrete pipe.
  - (c) Precast concrete pipe.
  - (d) Steel pipe.
3. Losses and recoveries:
  - (a) Flume inlet and outlet structures.
  - (b) Siphon inlet and outlet structures.
4. Value of Kutter's  $n$  in concrete flume:
  - (a) Monolithic jointed flume.
  - (b) Monolithic continuous flume.
  - (c) Semi-precast flume.
  - (d) Gunite flume (sides shot against forms, bottom gun finish).
  - (e) Combination gunite and concrete flume.
  - (f) Gunite canal lining (all gun finish).
  - (g) Concrete canal lining, trowel finish.
  - (h) Concrete canal lining, finished with wood float or other similar finish.
5. Control section weirs.
  - (a) Establish rating curve.
  - (b) Determine necessary loss through structure.
6. Head gates:
  - (a) Coefficient of discharge for gate opening.
  - (b) Coefficient of recovery below gate.
7. Pipe turnouts:
  - (a) Coefficient of discharge (gate wide open).
8. Curve losses and disturbances in open channels:
  - (a) Semicircular flume.
  - (b) Rectangular flume.
  - (c) Trapezoidal channel.
9. Losses due to piers, bents, abutments, and other obstructions:
  - (a) Bridge piers and abutments.
  - (b) Check bents and abutments.
  - (c) Headworks, piers, and abutments.
10. Measuring gate (adjustable Henny Venturi flume):
  - (a) Establish rating curve.
  - (b) Determine necessary loss through structure.
11. Flow over dams:
  - (a) Shape of surface curve.
  - (b) Discharge over various shaped crests under different heads.
  - (c) Shape of nappe under different heads.
  - (d) Effect of velocity of approach.
12. Flow in spillway channels parallel to crest:
  - (a) Water surface curve in channel.
  - (b) Air content.
  - (c) Necessary effective area for letting air under nappe.

13. Chutes:
  - (a) Value of Kutter's  $n$ .
  - (b) Air content.
  - (c) Effect of curvature.
  - (d) Angle of entrance to basin.
  - (e) Effective length of basin.
  - (f) Effect of baffles in basin.
14. Hydraulic jump:
  - (a) Velocity above and below.
  - (b) Height of jump.
  - (c) Cross section of channel.
  - (d) Profile of channel for some distance up and downstream.
  - (e) Details of any local obstruction.
15. Siphon spillways:
  - (a) Losses segregated as far as possible.
  - (b) Overall coefficient of discharge.
  - (c) Depth of crest and interval of time to prime.
  - (d) Position of water surface when seal breaks.
  - (e) Surface curve at approach of siphon.
  - (f) Elevation above sea level and barometric pressure at time of experiment (for high siphons).
16. Percolation factors and uplift:
  - (a) Salmon Lake Dam.
  - (b) Percha Dam.
  - (c) Grand Valley Dam.
  - (d) Canal structures.
  - (e) New dams.
17. Saturation slopes:
  - (a) Salmon Lake Dam.
  - (b) Deer Flat embankments and other earth dams.
18. Beaching slopes:
  - (a) Gravel embankment.
  - (b) Earth embankment.
19. Wave heights:
  - (a) Effect of fetch.
  - (b) Height of splash on different slopes.
20. Outlet works:
  - (a) Losses, segregated as far as possible (gates wide open).
  - (b) Overall coefficient of discharge.
  - (c) Capacity curves.
  - (d) Path of issuing jet from Arrowrock type outlets.
  - (e) Water cushion.
21. Coefficient of friction:
  - (a) Handwheel and crank pulls for gate hoists under different load conditions.
  - (b) Gate leaf against sliding surfaces.
  - (c) Stem in guide.
  - (d) Radial gate seals.
  - (e) Concrete flume on earth.
5. Gunite Flume (sides shot against forms, bottom gun finish):
  - (a) Determine value of Kutter's  $n$ .
6. Wasteway from Four-Mile Flume (basin type):
  - (a) Determine capacity without check.
7. Big Pilgrim Siphon (wood-stave pipe):
  - (a) Determine inlet, outlet, and curve losses.
8. Little Pilgrim Siphon (monolithic concrete pipe):
  - (a) Determine inlet, outlet, and curve losses.
9. Flume transitions (modern design):
  - (a) Determine transition losses.
10. Deer Gulch Siphon (part monolithic concrete pipe and part wood-stave pipe):
  - (a) Determine inlet, outlet, and curve losses.

## RIO GRANDE PROJECT.

1. Radial gate hoists (worm-gear type):
  - (a) Determine pull on handwheel and efficiency.
2. Leasburg Dam:
  - (a) Determine coefficient of discharge over crest.
3. Percha Dam:
  - (a) Determine upward pressure under foundation (hydraulic gradient).
  - (b) Determine coefficient of discharge over crest.
  - (c) Investigate standing wave below dam.
  - (d) Investigate water surface curve above dam.

## SHOSHONE PROJECT.

1. Metal flume on curve (No. 144 on curve of 63.6 feet radius):
  - (a) Investigate curve losses.

## SUN RIVER PROJECT.

1. Siphon spillway (gooseneck type):
  - (a) Determine discharge coefficient and sensitiveness in priming.

In reestablishing this department as a regular feature of the RECLAMATION RECORD, it is intended that it shall serve as a medium of communication between the engineers of the Service on all subjects of common interest whether such communication relates to experimental work on the subjects above outlined and others, or on methods of design, construction, or operation of engineering works.

Frequently a subject comes up on a project that has been solved satisfactorily on another project. The answer may be obtained through these columns; or a structure has been built that has given unusual satisfaction; another may have been unsuccessful. The other projects should know about this. Such cooperation between the different projects will result in benefit to all and increased efficiency throughout the Service in design, construction, and operation of the irrigation works.

The primary object of this department of the RECLAMATION RECORD should, however, not be lost sight of, namely, that it shall give the results of engineering investigations made with a particular object in view. It is not necessary that such an article shall cover the subject exhaustively; it may be in the nature of a progress report. Later on all the material on any one subject can be brought together and printed in some more complete form.

Occasionally we find engineers who are inclined to belittle the importance of experimental research, believing it to be of purely academic interest and not worthy of the time and energy of a busy practicing engineer. Engineers who take this view should remember that practically all the fundamental principles of sound engineering practice are founded upon experimental researches, and the modern engineer would be in sad straits indeed were it not for the painstaking efforts of past experimenters.

It is urged upon engineers of all grades that they give this matter individual and serious thought to the end that this work and the publication of results in these columns may be made of the greatest possible benefit.

Owing to the limited allotment for experimental investigation work to be done in the fiscal year 1921 it has been necessary to outline only a very small portion of the work as proposed in the above paragraphs. In deciding upon the following program careful consideration has been given to the urgency of the need for the data and to the project facilities for obtaining them. Following is an outline of the proposed program of experimental investigation work to be done during the fiscal year 1921:

## PROGRAM OF EXPERIMENTAL INVESTIGATIONS FOR FISCAL YEAR 1921.

## GRAND VALLEY PROJECT.

1. Grand River Dam:
  - (a) Continue recording well readings to determine the hydraulic gradient under dam.
  - (b) Experiments to determine coefficient of discharge over crest of dam.

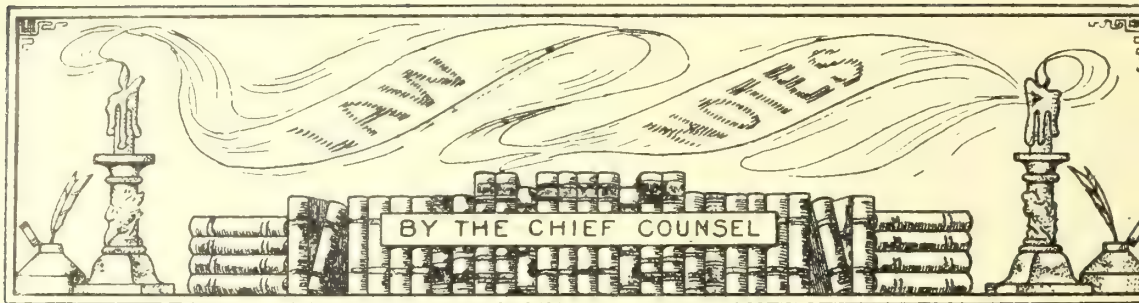
## HUNTLEY PROJECT.

1. Henny Venturi measuring gate:
  - (a) Determine coefficients of discharge.
2. Control section weir:
  - (a) Determine coefficients of discharge and establish rating curve.

## KING HILL PROJECT.

1. Siphon Spillway, Malade Flume (Gooseneck type):
  - (a) Determine losses segregated as far as possible.
2. Combination Gunite and Concrete Flume:
  - (a) Determine value of Kutter's  $n$ .
3. Semiprecast Flume:
  - (a) Determine value of Kutter's  $n$ .
4. Monolithic Jointed Flume:
  - (a) Determine value of Kutter's  $n$ .





### Immunity from State Control of Instrumentalities of the United States.

ON November 8, 1920, in the case of *Johnson v. Maryland* (252 U. S., —), the United States Supreme Court rendered a decision relative to immunity from State control of the instrumentalities of the United States, which is of particular interest to the Reclamation Service. The opinion of the court in this case, delivered by Mr. Justice Holmes, is as follows:

The plaintiff in error was an employee of the Post Office Department of the United States and while driving a Government motor truck in the transportation of mail over a post road from Mount Airy, Md., to Washington was arrested in Maryland, and was tried, convicted, and fined for so driving without having obtained a license from the State. He saved his constitutional rights by motion to quash, by special pleas which were overruled upon demurrer, and by motion in arrest of judgment. The facts were admitted and the naked question is whether the State has power to require such an employee to obtain a license by submitting to an examination concerning his competence and paying \$3 before performing his official duty in obedience to superior command.

The cases upon the regulation of interstate commerce can not be relied upon as furnishing an answer. They deal with the conduct of private persons in matters in which the States as well as the General Government have an interest and which would be wholly under the control of the States but for the supervening destination and the ultimate purpose of the acts. Here the question is whether the State can interrupt the acts of the General Government itself. With regard to taxation, no matter how reasonable, or how universal and undiscriminating, the State's inability to interfere has been regarded as established since *McCulloch v. Maryland* (4 Wheat., 316). The decision in that case was not put upon any consideration of degree but upon the entire absence of power on the part of the States to touch, in that way at least, the instrumentalities of the United States (4 Wheat., 429, 430), and that is the law today. (*Farmers & Mechanics Savings Bank v. Minnesota*, 232 U. S., 516, 525, 526.) A little later the scope of the proposition as then understood was indicated in *Osborn v. Bank of the United States* (9 Wheat., 738, 867). "Can a contractor, for supplying a military post with provisions, be restrained from making purchases within any State, or from transporting the provisions to the place at which the troops were stationed? Or could he be fined or taxed

for doing so? We have not yet heard these questions answered in the affirmative." In more recent days the principle was applied when the governor of a soldier's home was convicted for disregard of State law concerning the use of oleomargarine when furnishing it to the inmates of the home as part of their rations. It was said that the Federal official was not "subject to the jurisdiction of the State regard to those very matters of administration which are thus approved by Federal authority." (*Ohio v. Thomas*, 173 U. S., 276, 283.) It seems to us that the foregoing decisions establish the law governing this case.

Of course, an employee of the United States does not secure a general immunity from State law while acting in the course of his employment. That was decided long ago by Mr. Justice Washington in *United States v. Hart* (Pet. C. C., 390; 5 Op. Att. Gen., 55). It very well may be that, when the United States has not spoken, the subjection to local law would tend to general rules that might affect incidentally the mode of carrying out the employment—as, for instance, a statute or ordinance regulating the mode of turning at the corners of streets. (*Commonwealth v. Clason*, 229 Mass., 329.) This might stand on much the same footing as liability under the common law of a State to a person injured by the driver's negligence. But even the most unquestionable and most universally applicable of State laws, such as those concerning murder, will not be allowed to control the conduct of a marshal of the United States acting under and in pursuance of the laws of the United States. (*Ex parte Neagle*, 135 U. S., 1.)

It seems to us that the immunity of the instrumentalities of the United States from State control in the performance of their duties extends to a requirement that they desist from performance until they satisfy a State officer upon examination that they are competent for a necessary part of them and pay a fee for permission to go on. Such a requirement does not merely touch the Government servants remotely by a general rule of conduct; it lays hold of them in the specific attempt to obey orders and requires qualifications in addition to those that the Government has pronounced sufficient. It is the duty of the department to employ persons competent for their work, and that duty it must be presumed has been performed. (*Keim v. United States*, 177 U. S., 290, 299.)

### Operation and Maintenance Charges by Irrigation Districts in Idaho.

George W. Gess was the owner of a right, initiated in 1878, to the use of 250 miner's inches of water for irrigation from Boise River, Idaho. The Mon-



PORTER W. DENT

District counsel, United States Reclamation Service, El Paso, Tex. Born in Sharon, Tenn., January 17, 1876; educated in public schools of Tennessee, Bethel College, McKenzie, Tenn., and Emory and Henry College of Virginia; graduated from law department Cumberland University of Tennessee in 1897; took special course in legal work Columbia University, New York City; in private practice and with Court of Private Land Claims, St. Louis, Mo., 1897 to 1900; engaged in legal work New York City, 1901 to 1904; in private law practice Roswell, N. Mex., 1905, 1906; entered Reclamation Service March 21, 1907; has been admitted to practice in all courts of Tennessee, Missouri, New Mexico, Texas, and District, Circuit Court of Appeals, and Supreme Court of the United States. Mr. Dent is legal adviser for the Hondo, Carlisbad, and Rio Grande projects.

Canal, in which this water was carried, was at first a primitive though efficient structure, having a low operation and maintenance cost. Later it was enlarged, without benefit to Gess, to serve a greater area, and it finally became a part of the extensive system of the Nampa and Meridian Irrigation District. The Gess lands are not in that district, but delivery of water to them is made by the district. Dispute arose as to what proportionate part of the

operation and maintenance cost the lands in question should pay, the district contending that charges should be made upon the basis of the total cost of running the district, the landowner claiming the charge against him should be computed upon the basis of the cost of running the small system as it existed before the enlargement of the canal and its acquisition by the district. The Supreme Court of Idaho, in *Gess v. Nampa & Meridian Irrigation District* (192 Pac., 474), deciding the contention in favor of the landowner, argues the point as follows:

The district's contention that Gess was a joint owner in the canal system is sound to only a limited extent; that ownership is confined to the interest he had by virtue of his water right in the Morris Canal. When the district's predecessors purchased that canal they took it subject to the rights of Gess and burdened with its obligation to him and his successors. They could and did enlarge and extend it for the benefit of themselves and others, whose lands were to be by that means supplied with water; but they could not and did not thereby diminish his rights or increase his burdens. By enlarging and extending the canal the district's predecessor neither conferred upon Gess an interest in the enlarged system, nor did it deprive him of his interest in the property as it existed before it was enlarged.

While, as a matter of fact, the Morris Canal has been so merged in the enlarged system that it may no longer be distinguished from other component parts thereof, in contemplation of law it still exists as a separate entity, and limits the liability of the Gess lands for contribution to the cost of maintenance of the irrigation system and the distribution of water therefrom. (*Nampa & Meridian v. Manbille*, 31 Ida., 397; 173 Pac., 113.) That contribution should not be in excess of the amount it would have cost to deliver 250 miner's inches of water through the Morris Canal to the land in question had it not been enlarged or extended beyond the limits and capacity contemplated at the time the predecessor of Gess purchased the water right.

#### Conditions Under Which Award of Use of Water by Rotation Permissible.

Under conditions differing from those present in *Muir et al. v. Allison et al.*, cited above, the district court of appeal, third district of California, in the case of *Peacke v. Harris et al.* (192 Pac., 310) held an award of the use of water by rotation permissible. In the California case there was not enough water for the concurrent use by all the parties, and for many years past the irrigation of their lands had been intermittent and alternating.

#### Consent to Rotation System Necessary in Idaho.

In a suit to quiet title to the use of water the Supreme Court of Idaho in the case of *Muir et al. v. Allison et al.* (191 Pac., 206) refused to adopt the rotation system of distribution, the court holding



that a practice having grown up among irrigation communities to the effect that when a user of water had secured the right to divert a certain quantity he was thereafter entitled to a continuous flow of that amount during the irrigation season, and such practice having been sanctioned and confirmed by the Legislature and courts of Idaho throughout a long period, the rule of *stare decisis* applies and the practice of rotation in the use of water can not be imposed upon those entitled to the use of such water without their consent.

### Discovery of Springs on Public Lands.

Merely discovery of springs on the public lands confers no right to divert or use any of the water, and even when such discovery is followed by actual diversion and beneficial use and thus ripens into a valid appropriation it is limited to the greatest amount of water actually taken and beneficially used, and any surplus is properly subject to appropriation by other persons. (*Simons v. Inyo Cerro Gordo Mining and Power Co., et al.*, 192 Pac. 144.) In the case cited the water was conveyed in kegs on muleback from the spring to a mining camp some distance away where it was sold by the gallon, but the court took occasion to point out that the mode of diversion was immaterial.

### Irrigation District Not Authorized to Pay Legal Expenses of Organization.

The rule that a corporation, private or public, can not be held liable for the acts of its promoters was applied in the case of *Biggart v. Lewis*, decided by the Supreme Court of California September 11, 1920 (192 Pac. 437), the court holding in that case that Los Angeles County Irrigation District No. 3 was not liable for legal services rendered to procure its organization, there being no express authorization for such payment in the law under which the district was created.

### Distinction Between Acts of United States as a Contractor and as a Sovereign.

A contract between the United States and the National Brass & Copper Tube Co. provided for certain liquidated damages for each day's delay in delivery of goods, but that the company should receive credit for all such delays "due to action of the United States." A delay of 20 days was caused by lack of fuel in the winter of 1918, which, it was suggested by the company, resulted from the operation of the United States Fuel Administration, and therefore was "due to action of the United States." The comptroller on September 27, 1920 (27 Compt. Dec., 281), held that the provision in question must be con-

strued as referring to actions of the United States in the capacity of a party to the contract, and not to actions of the United States as a sovereign, taken in the common interests and affecting all citizens alike, and would therefore not include the general regulatory acts of the Fuel Administration.

### Warrants in Satisfaction of Condemnation Awards Not Payable to Attorneys.

The warrant issued by the United States in satisfaction of an award for damages in a condemnation suit should be made payable to the defendant owners of the property and not to the attorneys for such owners. (Auditor's Decision, Nov. 8, 1920, re Williams Estate Co., Newlands project.)

### Eugene W. Burr Leaves the Reclamation Service.

District Counsel Eugene W. Burr, of San Francisco, Calif., for 14 years an attorney in the legal division of the Reclamation Service, has, upon his request, been transferred, at a substantial increase in salary, to the law department of the Federal Trade Commission, with headquarters at Washington, D. C.

Mr. Burr's employment as an attorney in the Reclamation Service began on December 16, 1906, at Fallon, Nev. March 18, 1909, he was transferred to Klamath Falls, Oreg.; January 15, 1910, to Orland, Calif.; September 2, 1919, to Boise, Idaho; and December 20, 1910, to Yakima, Wash. Early in 1917 he was sent to Denver, Colo., where for over three years he had general control of matters relating to irrigation district organization. In May, 1920, he took charge of our San Francisco office.

Mr. Burr is a coauthor with Judge Will R. King of a valuable treatise upon the law of irrigation districts. He is an excellent lawyer with the highest of ideals, and the Federal Trade Commission is to be congratulated upon securing his services.

—Ottamar Hamels.

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It is a wonderful "gift" which enables some men, in this present time of unrest and dissatisfaction, to combine the ideal and the practical and tangible so successfully as has been done in the reclamation projects. Miss Lela B. White, Executive Secretary, Home Service Section, American Red Cross, Wisner, Nebr.

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During 1921 the better live-stock work is to be amplified with a view to furnishing live-stock growers new and useful information on breeding. One branch of this work in the cause and prevention of runty live-stock is in progress.

## WASHINGTON'S BIG IRRIGATION PROJECT.

### Columbia Basin Project.

A report by Columbia Basin Survey Commission, State of Washington. Olympia: Frank M. Sanborn, public printer, paper: 6 by 9 in.; pp. 185; illustrated.

**T**HE bigness of the West and its ideas are well illustrated by this report. The census of 1910, covering 54,000 irrigation enterprises, reported their total cost as \$308,000,000, an average of \$16 per acre. Now, there is proposed a single project estimated to cost \$300,000,000 for the irrigation of 1,753,000 acres, or \$171 per acre. Water would be stored in one State, diverted from its natural channel in a second, and delivered for irrigation in a third. From the point of storage to that of use the irrigation water would be conveyed over 200 miles in natural channels and 130 in an artificial supply main, with branch mains aggregating 1,000 miles and laterals thousands more. The main canal would have a capacity of 20,000 second-feet, eight or ten times that of the largest irrigation canals built by the Reclamation Service to date.

Lying east of the Columbia River and north of its junction with the Snake at Pasco, Wash., is a great area of arid prairie land, sparsely settled, worth a few dollars per acre. Favored in soil and sunshine, topography and transportation facilities, this area, as large as Connecticut, yields an uncertain grain crop or is mainly valuable for grazing. "All it needs is water." The precipitation varies from 6 to 12 inches, falling mainly during the winter. In July and August when more than a foot of moisture is desirable for full crop growth, nature applies less than an inch.

Attention was long ago called to the great value of this area if its irrigation could be accomplished. In the early days of the United States Reclamation Service it made some studies of possible projects, but suspended operations when these were found infeasible or the cost too high for the funds available. In its 18 years of work the Service has built projects costing about \$125,000,000, or 40 per cent of the estimate for the Columbia Basin development.

In 1919 the State of Washington enacted a law appropriating funds for an investigation by a State Commission resulting in the present report. The Commission consisted of Marvin Chase, M. Am. Soc. C. E., State Hydraulic Engineer, Chairman; O. L. Waller, M. Am. Soc. C. E., head of the Department of Civil Engineering, State College of Washington, Secretary; E. F. Benson, State Commissioner of Agriculture; Peter McGregor, Director Spokane Federal Reserve Bank; and Arthur D. Jones, Investments. The staff conducting field operations, office studies and designs included Arthur J. Turner, M. Am. Soc. C. E., Chief Engineer, and J. C. Ralston, M. Am. Soc. C. E., Consulting Engineer.

Under the project proposed by the Commission water control would begin with storage in Flathead Lake, Mont. Thence the stored water would course the Flathead River and the Clark's Fork of the Columbia, joining with the natural run-off entering Pend Oreille Lake, Idaho. Below the latter a dam at Albany Falls would serve to provide additional storage in the Lake and to divert the irrigation flow into the head of the artificial supply main. This would be in tunnel for about 5 miles, emerging near Penrith, Wash., to utilize the Little Spokane River, canalized for the purpose, as a channel to Chain Lakes, which would be raised by the Camden Dam. Southward from Camden to Spokane the aqueduct would alternate between open channel and tunnel the Milan, Deep Creek, Deadman Creek, and Pleasant Prairie Tunnels. The open channels would include lakes formed by dams at Dry, Deep, and Deadman Creeks. The Spokane River crossing would be made just east of the city. Thence an open channel and the Manitou Tunnel would deliver the water to Latah Creek, where another dam would be required. From Latah Creek Lake the flow would enter Bonnie Lake Tunnel, the longest of the system, between 15 and 16 miles. This would deliver to Rock Creek, and a dam at the outlet of Rock Lake would form an enlarged basin from which the water would be carried mainly in open channel to the end of the supply main at Hillcrest, about 10 miles southeast of Ritzville.

In addition to those named above, smaller dams are proposed at several points on the main canal and distributaries. Six of these are proposed to care for overflow from wasteways on the project and may be designed to provide also for secondary storage. In all, 20 dams are listed in the report. Those at Flathead and Pend Oreille Lakes are to be of concrete, the others of earth and rock fills. The structures would vary in length from 450 to 6,800 feet, in height from 28 to 180 feet, would aggregate over 25,000,000 yards, and are estimated to cost about as many dollars.

A comparable amount would be expended on the open canal stretches of the supply main, and roughly the same cost is estimated for the smaller distributaries below 100 second-foot capacity. The larger distribution features are estimated to cost over a hundred million dollars.

Thirteen tunnels are proposed on the distributaries, making 21 in all. These aggregate about 80 miles of single bore and are estimated by the Commission to cost \$119,000,000. The tunnels on the supply main would be twin bores, 33 feet 5 inches diameter, except the Bonnie Lake Tunnel, on which the bores would be



31 feet 4 inches. It is proposed to line tunnels and canals with concrete.

Other construction features include 33 inverted siphons, estimated to cost \$34,800,000; 19 railroad underpasses, and a larger number of spillways, wasteways, and other miscellaneous structures. The total estimated cost is summarized as follows:

<i>Cost of structures, Pend Oreille maximum development.</i>	
Flathead Reservoir	\$2,090,933
Pend Oreille Reservoir	1,194,368
Albany Falls headgates	440,841
Newport Tunnel	18,394,255
Canal Newport Tunnel to Chain Lakes	2,370,290
Canal Chain Lakes to Hillcrest	25,191,161
Camden Dam	1,437,788
Dry Creek Dam	1,149,905
Milan Tunnel	8,568,410
Deep Creek Tunnel	3,856,821
Deep Creek Dam	731,807
Deadman Creek Tunnel	5,396,817
Deadman Creek Dam	3,804,747
Pleasant Prairie Tunnel	10,083,948
Spokane River Crossing	1,267,539
Manito Tunnel	10,628,080
Latah Creek Dam	2,487,754
Bonnie Lake Tunnel	46,081,166
Rock Lake Dam	2,407,471
Wassun Creek inverted siphon	782,588
Dragon Lake Dam	17,659
McCall Dam and Dike	401,402
Patterson Tunnel	2,498,344
Cow Creek inverted siphon	2,469,286
Hillcrest inverted siphon and gates	666,718
Fences, Albany Falls to Hillcrest	106,200
Telephone lines, Albany Falls to Hillcrest	91,200
Distribution, North Division	<sup>1</sup> 57,461,163
Distribution, Central Division	<sup>1</sup> 23,160,325
Distribution, South Division	<sup>1</sup> 26,646,606
Distribution, Lateral "MI"	178,080
Distribution system below 100 second feet capacity	26,295,000
Spillways and wasteways	3,027,345
Lateral headgates	403,213
Railroad and highway changes and crossings	4,084,648
General incidentals, miscellaneous items, including patrol houses	750,000
General engineering, administration, and legal expenses preceding construction	1,051,800
Administration, legal, and general expense during construction	2,800,000
Total cost maximum development	300,475,678

It is obvious that the financing of an undertaking of such magnitude is an important problem. On this the report promises a supplemental publication. Meanwhile the published report contains a worthy caution against the evils of premature settlement and high prices for raw land. To quote from the report itself:

"It is difficult to find any justification for asking a higher price for the raw undeveloped land than the first mentioned values of \$3 to \$5 per acre. *The other costs accrue against the actual settler and farmer on the land, and he should not pay more per acre than the few dollars mentioned.*

*This land should not be purchased by the prospective settler until the water is ready for delivery on the land."*

You wouldn't board a hired man all winter if he didn't work, would you? Then, why board the hen that never lays an egg?

<sup>1</sup> Does not include highway changes, which are grouped under "Railroad and highway changes and crossings."

## RECLAMATION ABROAD.

### Irrigation Project in Jamaica.

Interest in irrigation is developing in the island of Jamaica. The latest project is to water the Liguanea Plains, in the western section of the parish of St. Andrews, particularly the part extending from Half-Way Tree to the Spanish Town Road. This section of the parish of St. Andrews, near the city of Kingston, is so dry that practically nothing will grow there. The proposition is to tap the numerous springs in the Red Hills, where at present the water not only goes to waste but produces miles of swamps, which are the breeding places of mosquitos. The springs also make useless great tracts of land farther west on the Spanish Town Road.

The irrigation scheme referred to would serve the double purpose of using the water from the Red Hill springs and the Duhaney River for irrigation and at the same time reclaiming the swamp lands to the west. The proposed work is under the direction of the Honorable Director of Public Works, Kingston, Jamaica.—*Commerce Reports.*

### Irrigation Project in Sonora, Mexico.

The State of Sonora is contemplating a project to utilize the waters of the Sonora River for reclaiming lands now too arid for profitable farming. The governor has submitted the plan to the State congress, which has jurisdiction because the river does not reach the sea but sinks some 15 miles from the coast line. It is thought that the project will cost about \$5,000,000, of which the National Government is expected to furnish 60 per cent and the public 40 per cent. Purchasers of the irrigation bonds will be eligible to buy land with water rights. Owners of private lands have agreed to donate one-half of their acreage to the State, which will thus be able to sell such lands as well as the public lands subject to irrigation. The price placed on the land will be based upon the cost of the project.

A committee of engineers from Mexico City is expected in Sonora to examine the plan. Before taking up the project the governor had a representative visit the Roosevelt Dam and study the American system of reclamation. The Government hopes to have this work under way by next March.—*Commerce Reports.*

Of the 46 States cooperating with the United States Department of Agriculture in advancing the merits and use of pure-bred sires, Virginia, Nebraska, South Carolina, Massachusetts, and Washington have been especially prominent.

## MONTHLY PROGRESS REPORTS FOR OCTOBER.

Monthly conditions of principal Reclamation Service reservoirs for October, 1920.

[Elevation above sea level.]

State and project.	Reservoir.	Available capacity, in acre-feet.	Elevation.		Storage in acre-feet.			Out-flow in acre-feet.	Elevation of water surface.		
			Spill-way crest. <sup>1</sup>	Lowest gate sill. <sup>2</sup>	Beginning of month.	End of month.	Maximum.		Beginning of month.	End of month.	Maximum.
Arizona, Salt River.....	Roosevelt <sup>3</sup> .....	1,305,000	2128	1903	984,705	952,680	984,705	32,025	2103.41	2101.14	2103.41
California, Orland.....	East Park.....	51,000	1199.68	1111.68	300	313	313	.....	1132.31	1132.55	1132.55
Idaho:											
Boise.....	Arrowrock.....	280,000	3211	2956	.....	22,162	22,162	23,336	2967	3060.8	3060.8
	Deer Flat.....	177,000	2518	2488	11,296	20,610	20,610	2,242	2492	2494.95	2494.95
Minidoka.....	Lake Walcott.....	95,180	4245	4236	92,740	93,320	105,910	163,700	4244.79	4244.84	4245.89
	Jackson Lake.....	817,000	6769	6730	142,920	183,120	183,120	.....	6737.95	6740.03	6740.03
Montana:											
Milk River.....	Nelson.....	27,000	2212	2200	26,000	21,300	26,000	2,000	2212.2	2210.1	2212.2
St. Mary storage.....	Sherburne.....	33,000	4788	4720	5,000	5,000	5,000	.....	4735	4735	4735
Sun River.....	Willow Creek.....	16,700	4130	4085	10,942	11,243	11,243	.....	4123.7	4121.1	4124.1
Nebraska-Wyoming, North Platte.....	Pathfinder.....	1,070,000	5852	5670	658,890	633,180	658,890	59,415	5829.8	5828.04	5829.8
	Lake Alice.....	11,400	4182	4159	7,829	8,903	8,903	.....	4177	4178.6	4178.6
	Lake Minatare.....	60,700	4125	4074	18,106	50,389	50,389	.....	4100	4120	4120
Nevada, Newlands.....	Lake Tahoe.....	120,000	6230	6224	.....	.....	.....	.....	6224.71	6224.5	6224.71
	Lahontan.....	290,000	4162	4060	89,280	84,575	89,280	10,560	4133.2	4132.1	4133.2
New Mexico:											
Carlsbad.....	McMillan.....	45,000	3267.7	3241.6	17,000	12,500	17,000	6,000	3261.7	3260.4	3261.7
Rio Grande.....	Elephant Butte.....	2,638,800	4407	4321.5	1,818,559	1,750,745	1,818,559	57,083	4383.95	4381.8	4383.95
Oregon, Matilla.....	Cold Spring.....	50,000	621.5	560	5,875	9,150	9,150	181	578.18	583.6	583.6
Oregon-California, Klamath.....	Clear Lake.....	462,000	4540	4514	256,000	256,000	256,000	.....	4531.5	4531.5	4531.5
South Dakota, Belle Fourche.....	Belle Fourche.....	203,000	2975	2920	139,140	138,500	139,140	.....	2966.1	2966.1	2966.1
Utah, Strawberry Valley.....	Strawberry.....	250,000	7558	7517	191,000	193,000	238,000	.....	7550.1	7550.1	7550.1
Washington:											
Okanogan.....	Conconully.....	13,000	2287	2232	.....	300	300	433	2237	2242	2242
Yakima.....	Bumping Lake.....	34,000	3426	3389	9,730	19,500	19,500	.....	3403.2	3413.9	3413.9
	Lake Clealum.....	22,800	2134	2122	17,565	14,725	29,495	14,770	2131	2129.7	2136.3
	Lake Kachess.....	210,000	2258	2192	97,995	117,270	117,270	.....	2227	2232.4	2232.4
Wyoming, Shoshone.....	Lake Keechelus.....	152,000	2515	2425	13,185	22,130	22,130	.....	2435.4	2442.3	2442.3
	Shoshone.....	456,600	5360	5132.3	444,680	431,688	444,680	42,487	5358.2	5356.2	5358.2

<sup>1</sup> Or maximum storage.<sup>2</sup> Or zero storage.<sup>3</sup> Zero water depth at elevation 1902.2.<sup>4</sup> Amount of silt shown by silt survey deducted from original capacity.<sup>5</sup> Proposed regulation.<sup>6</sup> Estimated low-water limit under proposed plan of regulation.

## SALT RIVER PROJECT, ARIZONA.

*Operation and maintenance of irrigation system.*

There was very little water run in the canals during October, owing to the light demand.

Three maintenance crews were in the field during the month, and the following statement shows the average number of men and stock employed and the results accomplished: Average number of men 81; average head of stock, 12; miles main canals cleaned, 15½; miles laterals cleaned, 87; number new structures installed, 3; number old structures repaired, 156; rip-rap placed, 1,668 linear feet; dirt fill placed, 748 cubic yards; concrete placed, 10½ cubic yards; dry masonry placed, 80 cubic yards; concrete pipe laid, 40 linear feet; corrugated pipe laid, 25 linear feet; new road built, 1 mile.

Sixty head of stock were used during the month widening the Eastern Canal, moving 10,058 cubic yards of dirt. The Marion three-fourths-yard drag line was engaged in widening the canal, moving 1,993 cubic yards of dirt.

The P. & H. one-half-yard drag line was engaged in berming the Arizona Canal below Lateral 16, moving approximately 1,000 cubic yards in a distance of 5,740 linear feet.

The Ruth dredge was engaged in berming the east branch of the Consolidated Canal from Lateral 19 toward the head, moving approximately 5,100 cubic yards in a distance of 6 miles.

*Operation of power system.*—The total power generated during the month was 5,831,420 kilowatt-hours. The maximum load for the month was 12,120 kilo-

watts, on October 24, and the average load for the month was 7,840 kilowatts.

The Roosevelt power plant operated 716 hours during the month. Considerable maintenance work was done at Roosevelt during October. The Cross Cut power plant operated continuously, the South Consolidated 89 per cent, the Arizona Falls 42.5 per cent, and the Chandler power plant 100 per cent.

The substations all operated during October without any trouble, and all pumping plants were available as needed. Plant 3E 10N was overhauled.

*Construction work, Phoenix-Mesa telephone line.*

The setting of poles was finished. The stringing of wire between Phoenix and Mesa was completed and most of the wire on the Highline leg was strung. There remained about three days work to complete the job.

*Mesa City, old plant.*—The work on this installation was practically completed, as much as was possible pending the arrival of the motor. The motor base was received and set in place on the foundation provided for same.

*Roosevelt Dam, south spillway.*—On the first of the month a construction camp was established at Roosevelt and work started on the repairs to the south spillway. By the end of the month the work of excavating the material at the end of the old apron was well under way. There were 34 men at work the last of the month, working in two shifts.

*Office.*—A total of 91,322 acres, or 44 per cent, were entitled to irrigation water service on the first of the month.—C. C. Cragin.



## YUMA PROJECT, ARIZONA-CALIFORNIA.

October weather conditions were favorable; several high frosts occurred but no damage was caused. The demand for water was normal. The cotton crop is about normal; maize good; alfalfa seed about half of normal crop.

Labor conditions were fair. The supply of cotton pickers was not equal to the demand.

*Construction.*—On the East Drain Lateral the Bucyrus dragline advanced 0.32 mile (station 68+50 to station 85+50), excavating 25,100 cubic yards of material. Three small timber checks were built.

*Operation and maintenance.*—Nine thousand acre-feet of water were delivered to 20,000 acres. Monaghan dragline No. 1 was overhauled and moved to the Somerton Canal. Work on this canal was started October 23, and 1,100 feet of canal cleaned (station 0 to station 11), 3,300 cubic yards of material being moved. Monaghan dragline No. 2 continued work on the West Main Canal, cleaning 1 mile of canal (station 1.168 to station 1.218), moving 10,000 cubic yards of material.

The Ruth dredger cleaned 5.8 miles of laterals on the Indian reservation, moving 5,700 cubic yards of material.

The maximum discharge of the Colorado River during the month was 8,000 second-feet; minimum, 5,800 second-feet. On October 31 the gage reading was 16.8 and the discharge 8,000 second-feet. The total discharge for the month was 399,900 acre-feet.

*Arizona cooperative work.*—Work on estimates for the relocation of the Arizona Eastern Railway around the San Carlos Reservoir was continued till the 10th of the month, when the work was transferred to the Denver office.

*Boulder Canyon Reservoir.*—Work on the topographic survey of the reservoir site was continued, and drilling operations at the dam site were carried on.

*Imperial Valley investigations.*—Preliminary surveys for canal lines were continued; field work on the soil survey was carried on and estimates of irrigable area and costs of various plans for canal systems were begun.

Official visitors were Messrs. C. L. Snyder, United States Civil Service Commission; Nicanor Cortes and Angel Martinez, Bureau of Public Works, Manila, P. I.; C. E. Platt, examiner for the Service; O. P. Morton, special assistant to the Attorney General; and C. J. Blanchard, statistician, and his assistant.—*R. M. Priest.*

## YUMA AUXILIARY PROJECT, ARIZONA.

During October the field force employed devoted their time to final location, the setting of cross-section stakes, and yardage computations in connection with the George Co. contract, specifications No. 388. General plans were studied for the commencing of actual construction of the B Lift pumping plant, the manufacture of concrete pipe, and the building of roads on the Yum Mesa.

George Co., contractors for earthwork, had practically completed schedule No. 1 at the end of the month, their estimate for the month of October being 30,500 cubic yards.—*W. W. Schlecht.*

## ORLAND PROJECT, CALIFORNIA.

There were a few days of severe wind near the close of October and it became necessary to suspend

concrete-lining work, but for the most part the weather was favorable for outside operations. The rainfall amounted to 1.04 inches and there was an unusually heavy snowfall for so early in the season on the higher levels of Stony Creek watershed.

With the exception of milo no crops were being harvested in the project during the month.

Concrete lining was resumed on the 4th. An average force of 45 laborers and 24 head of stock was employed in placing 13,350 square yards of lining and delivering 1,050 cubic yards of gravel.

Project visitors were Congressman Clarence F. Lea, of this district; F. St. J. Gebbie and G. Gemmel, of the Department of Irrigation of India; R. P. Walters, assistant chief engineer; and T. G. Hough, examiner of accounts.—*L. N. Burch.*

## GRAND VALLEY PROJECT, COLORADO.

The weather during October was cool, with considerable rain, which interfered with outside work. Labor was still scarce on account of the demand for men to harvest the apples and sugar beets.

Harvesting of crops was in progress throughout the month. The third cutting of alfalfa had been stacked, and the harvesting of alfalfa seed was under way. Good progress was made in digging sugar beets and about 50 per cent of the crop had been shipped to the factory. The first killing frost of the season occurred on the 21st, which put an end to the tomato harvest but did no damage to the apples some of which were still on the trees. The yield of most of the crops, with the exception of sugar beets, was up to normal, but prices and marketing conditions were poor. The price of alfalfa dropped to \$12 per ton in the stack with very little demand.

The irrigation system was in continuous operation, supplying 3,000 acre-feet of water to project lands and 2,000 acre-feet to the irrigation districts. Water deliveries were discontinued for the season on November 1. Two small maintenance gangs were employed on repair work and the installation of lateral structures. The ditch riders completed the collection of data for the annual crop report.

Drainage construction was prosecuted during the month with two dragline excavators working in the Grand Valley drainage district and one excavator on the project. Two miles of open drain were completed, involving 50,000 cubic yards of excavation. One field party was employed on the investigation of seeped areas on the project.

Official visitors to the project were Assistant Chief Engineer R. F. Walter and Project Manager P. J. Preston. *S. O. Harper.*

## UNCOMPAHGRE PROJECT, COLORADO.

The first three weeks of October were favorable for harvesting crops. Since the storm of the 19th and 20th the fields have been too wet to harvest the root crops. These conditions were worse at the upper end of the project than at the lower end.

On account of the large apple crop in and around Montrose, all the help available was concentrated on the gathering of that crop before the above-mentioned storm, so that the beets and potatoes were neglected, and a considerable portion of these two crops were still in the ground at the close of the month. The potato crop in the vicinity of Olathe and Delta had been nearly harvested.

The harvesting of beets had just commenced before the wet weather set in, so that the major part of this crop was still to be gathered.

One and seven-tenths inches of precipitation fell during the latter 12 days of the month, which amounts to more than 22 per cent of the annual precipitation on the project.

The freeze following the storm of the 19th and 20th found from 20 to 25 per cent of the apple crop still on the trees. As a rule the apples remaining on the trees were of the poorer varieties and grades, and only a portion of these were ruined by the freeze.

There was little demand for water for irrigation during the month. Water was carried in practically all the system throughout the month for stock purposes. Water was turned out of the South Canal on the 15th in order to start repairs on the concrete lining. Water was out of the West Canal from the 5th to the 23d while repairs were made to the flumes across Tappan Creek and Spring Creek.

Maintenance work was materially interfered with on account of the heavy condition of the roads and the lack of labor during the latter part of the month. Concrete approaches were completed on the upper end of the Tappan Flume and on both ends of the Spring Creek Flume. These approaches were necessary to replace wooden ones that were showing signs of failure.

Preparatory work was under way for the renewal of the concrete floor and the reinforcing of the side walls of the South Canal below Tunnel No. 3 and above the Seven Drops. This work has been greatly retarded on account of the conditions mentioned above.

R. F. Walter, assistant chief engineer, visited the project October 19 to 21. *Porter J. Preston.*

#### BOISE PROJECT, IDAHO.

Unseasonable weather prevailed during October. For the first 21 days light showers occurred at intervals, with a total precipitation of 2.34 inches, which was 1.06 inches above normal. The mean temperature was 2 degrees below normal. The first killing frost occurred on the 19th.

*Labor conditions.*—Labor was fairly plentiful and little trouble was experienced in maintaining full crews. There was no change in the wage scale.

*Farming operations.*—Rains which occurred the latter part of September and the first of October found a large portion of the third cutting of alfalfa in the shock. Continued damp, cloudy weather resulted in heavy loss of this crop. Rains delayed apple picking, potato harvest, and clover hulling. By the last of the month the major portion of the apple and potato crops had been harvested and was being shipped as rapidly as cars could be obtained. The hay growers are still holding their crop. Owing to the low price of live stock the stockmen have delayed buying their winter supply, and as a result hay has dropped to the lowest price obtained during the past few years. The ground was in excellent shape for fall plowing, and this condition was taken advantage of by a number of the farmers.

*Water supply.*—For the first time during the year the monthly flow of the Boise River was about normal. Early storms deposited considerable snow in the high mountains, which should supply late irrigation water during the coming season.

*Operation and maintenance.*—Water was delivered for irrigation up to the 10th. The demand was light, however. Small heads were used for pasture, orchards, and late seeding. Water was turned out of the canal system on the 10th, and fall cleaning was im-

mediately begun. Rains, however, interfered seriously with cleaning work, and the canals were not in shape for economical operation until the last of the month. About 50,000 cubic yards of sand that had accumulated back of the Boise River diversion dam was sluiced out; this was completed on the 26th. From this date until the 30th water was run in the Main Canal for filling Deer Flat Reservoir. On the latter date leaks developed in the feeder canal, and it was necessary to turn the water out for repairs, which will take only a few days.

*Construction.*—Good progress was made with Government forces on the Notus Canal in placing concrete lining and installing turnouts and drainage culverts.

F. A. Gould and Gus Carlson Co., who have the contracts for excavation on the Notus Canal, began operations with small forces, but the greater part of the month was taken up in establishing their camps and little excavation was accomplished.

*Drainage.*—Drainage work was continued in the Big Bend and Riverside irrigation districts with two dragline excavators, each working two shifts. One crew was engaged in installing structures on the drainage ditches. Good progress was made both on the excavation and structure work.

*Surveys.*—Survey work for the month consisted in giving lines and grades for the drainage and construction work in progress. A portion of the lateral system under the Notus Canal was staked out and profiles prepared and yardages computed. Office studies were made in connection with the irrigation of additional lands in the Black Canyon irrigation district.

*Visitors.*—The following were official visitors on the project during October: Lieut. Herman Jansson, of the Swedish Royal Engineers; Señor Carlos A. Volpi, engineer in the irrigation service of Argentina; Barry Dibble, project manager, Minidoka project; C. J. Moody, engineer, Flathead project; A. H. Gullickson, chief accountant; F. St. J. Gebbie, chief of the irrigation department of India; and G. Gemmell, executive engineer.—*J. B. Bond.*

#### KING HILL PROJECT, IDAHO.

October weather was normal and favorable for construction work.

At Camp 4 excavation for the Head End flume was in progress throughout the month. Concreting was started on the 11th and was 30 per cent complete at the end of the month. The grading for the connection to Siphon No. 1 and the repairs to the outlet of the One Mile flume were started during the month.

At Camp 6 the upstream and the downstream cut-off walls of the inlet to McEachren wood-stave flume were poured and the McEachren concrete flume was completed on the 18th, except the pouring of contraction joints. Work was started on Wasteway No. 11 on the 19th and was practically complete at the end of the month. At the end of the month work was in progress on the connection between the concrete flume and the present wood-stave siphon. At Camp 7 grading for the Four Mile flume was completed and forms and steel are being placed for the pouring of concrete. The outlet of Big Pilgrim siphon was completed at the end of the month. At Camp 8 Cassia siphon was completed during the month and camp was moved. At Camp 10 camp was erected and excavation for Tuanna siphon started.

Excavation for the Greer flume between station 1351 and 1363 was in progress at the end of the month.

The operation and maintenance forces working under the King Hill irrigation district were engaged



in cleaning canals and repairing structures during the month.

Mr. F. St. J. Gebbie, chief engineer of the Irrigation Department of India, and Mr. Gemmell, executive engineer, visited the project on the 17th and 18th.—*Walter Ward.*

*Prevailing crop prices at close of October, 1920.*

Project.	Alfalfa hay, per ton.		Bar- ley, per bushel.	Oats, per bushel.	Wheat, per bushel.	Pota- toes, per bushel.
	In stack.	Baled at ship- ping point.				
Salt River.....	\$16-\$20	\$24-\$30	\$1.38	\$1.00	\$2.40	
Yuma.....	20.00	28.00				
Orland.....	20.00	25.00	.95		1.95	
Grand Valley.....	12.00	16.00	1.50	.75	1.50	\$0.70
Uncompahgre.....	8-12		1.50	.80	1.70	.70
Boise.....	6.00	12.00	.75	.90	1.80	.75
King Hill.....	12.00	16.50		.96		1.20
Minidoka.....	10.00	13.00	.84	.53	1.65	.60
Huntley.....	10.00	15.00		.72	1.73	1.80
Milk River.....	10.00	15-20	.58	.32	1.77	1.65
Sun River.....	14.00	20.00	.60	.58	1.71	.90
Lower Yellowstone.....	16.00		.80	.70	1.80	1.00
North Platte.....	7-10					.60
Newlands.....	15.00	20.00	1.00		1.98	.90
Carlsbad.....		22.00				
Rio Grande.....				.80	1.91	
North Dakota pumping.....						
Umatilla.....	13.00					
Klamath.....	15.00		.84	.67	1.92	
Belle Fourche.....	8.00	12.00	.72	.48	1.70	1.20
Strawberry Valley.....	17.50	20.00	1.45	1.08	1.80	.90
Okanogan.....	25.00	30.00				.60
Yakima:						
Sunnyside unit.....	12.00	16.00				.80
Tieton unit.....	12.00	16.00				.80
Riverton.....	12.00			1.00	1.32	.90
Shoshone.....	10.00	13.00		.70	1.75	.60
Indian projects:						
Blackfeet.....			.55	.30	1.68	
Flathead.....	20.00	25.00			1.64	.70
Fort Peck.....				.33	1.71	1.50

MINIDOKA PROJECT, IDAHO.

The irrigation season closed on October 15 and water was shut out of the Main South Side Canal for cleaning. At Jackson Lake a crew of 6 men and 3 teams was engaged until the 15th in removing drift wood from in front of the dam. All drift wood which had accumulated along the dike was burned. Re-setting of poles and rebuilding of transmission line on the Minidoka project was carried on during the month.

At American Falls the field parties worked on re-tracement of section lines, making a total to date of 117 miles. Drilling of test holes was started in the reservoir site, the depth of the combined holes drilled amounting to 259.3 feet.

Señor Carlos A. Volpi, one of the principal engineers in the irrigation service of Argentina, visited the Minidoka project on October 6, 7, and 8. He wishes to aid in interesting his Government in further extensive irrigation development. C. J. Blanchard, statistician, and R. B. Dame, official photographer, left the project on October 9.

The latter part of the month was unusually cold. Twenty-nine inches of snow fell, and although it melted quite rapidly it left the fields too wet to work in, and potato and beet digging was stopped. A defi-

nite decision has been reached to increase the capacity of the Burley sugar factory to handle 1,200 tons of beets per day. The factory at Paul will be increased from 650 to 900 tons daily. This action is being taken by the sugar company to take care of the increase in acreage of sugar beets promised here during the next few years.—*Barry Dibble.*

HUNTLEY PROJECT, MONTANA.

October weather conditions were ideal, there being only 0.11 inch of precipitation during the month. The days were mild and on only a few nights was freezing temperature noted. The labor situation was more discouraging than at any previous time during the year. Near the close of the month conditions improved materially and work progressed as usual.

Supplemental construction was the principal work undertaken. The replacement of structures on Lateral N was practically completed, and one check in the Main Canal near Lateral Q was started and about half completed by the end of the month. A measuring gate was constructed at the head of the Highline Canal, the same being a concrete structure with movable gate adjusting to suit variable discharge conditions. A number of minor structures were replaced on the various laterals of the first unit.

Operation and maintenance work was practically discontinued. During the summer a large amount of rock had slid into the Main Canal between tunnels Nos. 1 and 2 which was removed. One flume 50 feet long was replaced with an earth fill and culvert. A portion of the Main Canal below McCaffery Check has become badly eroded, and canal banks are in a dangerous condition. Surveys and estimates on gravel lining for this section were made, compiled, and submitted to Mr. Munn, consulting engineer, and authority received for proceeding with a portion of the repairs.

Harvesting of all crops was completed in good shape and no loss of crops will be experienced from untimely weather conditions.

*Drainage.*—The work with the Austin trencher, which was stopped on September 17, was resumed on October 19, and 1,900 feet of Drain No. 33 were completed by November 1. Several large flows of water were encountered and good results are expected. Back filling on Drain No. 32 was continued, and 4,000 feet of trench were refilled.

Estimates for the proposed drainage work on the second unit were compiled and submitted to Mr. Burkholder, drainage engineer.

*Visitors.*—Project Manager W. S. Arthur, of the North Dakota pumping project, called on October 2. On October 5 A. H. Gullickson, chief accountant, stopped on the project for a brief visit; on the 25th James Munn, consulting engineer, investigated proposed changes on the Main Canal, and on October 27 J. L. Burkholder, drainage engineer, reviewed the drainage problems.—*Wm. M. Green.*

MILK RIVER PROJECT, MONTANA.

Weather conditions for October were favorable for construction, maintenance work, and farming operations. Precipitation of about three-fourths of an inch on the 22d facilitated fall plowing, which was in full swing. Threshing operations were practically completed. A small amount of water was delivered to farmers during the month.

The labor supply continued severely acute until the closing days of the month when some improvement was shown. However, all crews were short-handed.

*Construction by contract.*—Work was actively in progress on six small earthwork contracts three of which were on extensions of the Nelson Reservoir South Canal lateral system near Hinsdale and three on the Vandalia South Canal lateral system near Glasgow. In addition, sewer and water service connections and foundation of the office building for Saco operation and maintenance headquarters were in progress.

*Construction by Government forces.*—A small crew was engaged on enlargement of the Nelson Reservoir South Canal near Beaverton. A few wooden turnouts and weirs were placed and foundation for permanent gate-tender's cottage at Vandalia Dma was built.

Maintenance work consisted principally of cleaning about 3,400 feet of the Dodson North Canal near Wagner by Monighan dragline, which was operated two shifts per day throughout the month. Painting of crest gates at Dodson Dam, and of flumes, turnouts, gates, etc., along the Vandalia South Canal, was continued. Cleaning of the Nelson Reservoir South Canal laterals of willows was completed. Work was commenced on repairing canal banks below the lined section at Rocky Point, mile 8, of the Dodson South Canal. Preparations were made for removing slides from the river bank at Vandalia Point by hydraulic process.

Official visitors included A. H. Gullickson, chief accountant; James Munn, consulting engineer; R. M. Snell, project manager of the St. Mary storage unit; and J. L. Burkholder, drainage engineer.—*George E. Stratton.*

#### ST. MARY STORAGE UNIT.

The weather during October was rather more favorable than usual for construction work in this vicinity. There was no severe storm until the end of the month, and except for light mountain storms and high winds conditions were very favorable for construction work.

Except for two caretakers at the camps on the canal, all of the force was employed at Sherburne Lakes Dam, where the embankment in the dam was completed, the parapet wall completed, the temporary spillway flume about half completed, gravel pit operations completed, and miscellaneous work done in connection with clearing the dam site, moving the construction plant from the gravel pit, and dismantling and preparing equipment for shipment. No operation and maintenance was done either on St. Mary Canal or Sherburne Lakes Dam.

The latter part of the month a type 30-B Bucyrus gasoline-operated caterpillar dragline was received at Cardston, unloaded from the cars, and partly erected.—*R. M. Snell.*

#### SUN RIVER PROJECT, MONTANA.

October weather was generally favorable for outside work.

The work on Pishkun Reservoir dikes was continued with a small force and fair progress made. Concrete lining of the Greenfields Canal, in Big Coulee, was nearly completed, and at the close of the month there remained about three days of concreting to complete this work. On the 15th a small crew began placing weirs on the Greenfields division to complete the work done by Government forces in 1919 under specification No. 358. Labor has been very scarce and difficult to obtain, but conditions were somewhat improved at the end of the month.

On the Fort Shaw division water was run in the Main Canal and principal laterals from the 1st to the 20th. With the exception of the deliveries for short periods for irrigation, the water was used for stock and domestic purposes. No water was run in the Greenfields Canal and lateral system.

A small crew of men and teams was employed during the month cleaning laterals and raising banks on the Fort Shaw division. On the Greenfields division the only maintenance work done was the overhauling of the two cottages moved from Camp 14 to Fairfield and repairs to telephone lines.

Twelve carloads of wheat were shipped from Fairfield and Simms during the month.—*Geo. O. Sanford.*

#### LOWER YELLOWSTONE PROJECT, MONTANA-NORTH DAKOTA.

Other than the 22d and 23d of October, when 1.76 inches of snow fell, the month was ideal for maintenance work, harvesting of all crops, and surveying. The precipitation was 1.2 times the normal for October, and the mean temperature was  $3\frac{1}{2}^{\circ}$  above the average.

Nearly all crops have been harvested and all that remain are a few scattering fields of late grain and the husking of corn. The tonnage of sugar beets per acre was considerably above the average and, from present indications, the acreage of sugar beets in 1921 will be double that of this year.

Dragline excavator No. 1 was working the entire month in removing silt through the reach of main canal known as the Arkle Cut. Machine No. 2 was repaired and placed in readiness at the end of the month for removal of silt below Thomas Point, or mile 19. Machine No. 3 made the best showing during October that has been made during any month of the season. This machine moved 14,900 yards of material between mile 25 and 26.4. A small maintenance crew was engaged on both district No. 1 and district No. 2 in installing concrete structures to replace the wooden type, and a small crew was also engaged in removing silt from laterals.

A survey party was engaged the entire month in locating laterals and canals under extension.

Petitions were being circulated for the securing of signatures to authorize the commissioners of Lower Yellowstone irrigation district No. 1 to execute a contract with the United States. The directors of irrigation district No. 2, or that part of the project in North Dakota, are also active in completing a proposed contract between the district and the United States.—*L. H. Mitchell.*

#### NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

October weather was favorable for all purposes. The mean temperature was  $2.9^{\circ}$  above the normal for October, and there was practically no precipitation until the last day of the month, when a snowstorm occurred, the depth of snow over the project varying from  $2\frac{1}{2}$  to  $4\frac{1}{2}$  inches.

*Operation.*—The outflow from the Pathfinder Reservoir was maintained at 1,500 second-feet until the 15th, after which the valves were closed during the day to permit work to be done on the new North Tunnel outlets. All valves were closed for the season on the 22d. The average inflow for the month was 608 second-feet.

The diversion into the Interstate Canal was maintained at 800 second-feet until the 25th, after which it was gradually reduced until all gates were closed on the 29th. All of the water diverted was used for storage in Lakes Alice and Minatare.



The Fort Laramie Canal was operated as far as the wasteway at mile 25.5 to furnish water for the operation of the Lingle power plant. The average diversion was 400 second-feet, of which the greater part was wasted back to the river at the sand trap at mile 0.6 to sluice sand from the canal.

**Maintenance.**—Owing to fine weather and the hearty cooperation of the farmers, good progress was made on the regular fall maintenance work and cleaning of laterals. Some work was done on replacing wooden lateral structures with concrete. The repairs to the paving on the Minatare Dam were completed. Monighan dragline No. 4 continued work on the Interstate Canal banks, working between miles 34.5 and 35.2. During the month 9,925 cubic yards of material were moved and 3,820 linear feet of bank strengthened, the average excavation per shift being 385 cubic yards.

**Crops.**—The potato crop had all been harvested, and the sugar-beet harvest was about 90 per cent completed. The crops were good, but the prices offered were unsatisfactory and in some cases less than the cost of production. Alfalfa hay was selling for \$7 to \$10 per ton in the stack, and the price offered for potatoes was \$1 per hundredweight. There was apparently little demand for either alfalfa or potatoes.

**Live stock.**—Comparatively little stock was being shipped in for winter feeding on account of the uncertainty of prices. Many of the old feeders had not decided to feed. At the close of the month only about 1,000 cattle and 12,000 sheep had been shipped in.

**Drainage.**—Monighan dragline No. 2 continued work on the excavation of the Lower Nine Mile Drain, operating with three shifts daily, with the exception of 10 days, when only two shifts daily were operated. During the month 10,215 cubic yards were excavated, or an average of 318 cubic yards per shift.

Dragline No. 3 continued work on the Dunham-Andrews Drain, operating with three shifts daily until the 17th, after which only two shifts daily were worked. This machine excavated 16,285 cubic yards of material, or an average of 337 cubic yards per shift. The construction forces completed the timber high-way bridge over the big cut on this drain and also two farm bridges and started work on the concrete chute.

The Kelly Well Co. completed the drilling and casing of the third and last drainage well on Dutch Flats under contract of May 28, 1920. The pump and motor for well No. 1 arrived and was installed and pumping began on the 13th and continued until the 20th. A temporary housing was constructed over the pump and motor.

On the Fort Laramie unit electric dragline No. 2 resumed excavation on Cherry Creek Drain on October 4, after being idle for a month for repairs. The machine was operated with two shifts daily and moved 35,120 cubic yards of material, completing 1.04 miles of drain. Piling were driven for the highway bridge at station 638 of this drain.

**Construction, interstate unit.** Adams & Ash completed the construction of a four-room house at Lake Minatare camp.

Bids were opened on October 25 for the enlargement of the Sheep Creek Diversion Channel. Contract was awarded to W. R. Veneman, Iven Hodgell, and J. W. Hodgell, at 23 cents per cubic yard.

Advertisements were issued for graveling banks on the Interstate Canal, near Lingle, Wyo., the bids to be opened November 3, 1920.

**Fort Laramie unit.**—Electric dragline No. 1 continued work on the excavation of the East Springer Lateral, operating with two shifts daily, excavating 37,650 cubic yards of class 1 material and completing 1.67 miles of lateral. Dragline No. 3 continued work on the Fort Laramie Canal, operating with two shifts daily, excavating 27,768 cubic yards of material, including 5,884 cubic yards of class 2, and completing 0.25 mile of canal excavation. Dragline No. 5 continued work on the Fort Laramie Canal east of Horse Creek, operating with two shifts daily, excavating 35,200 cubic yards of material, including 8,900 cubic yards of class 2, and completing 0.49 mile of canal excavation.

The powder crew, averaging 6 men, drilled 3,081 linear feet of holes and used 6,350 pounds of T. N. T. in blasting classified material ahead of dragline No. 3.

Preparatory work was begun for the construction of the wasteway channel at mile 25.5 of the Fort Laramie Canal.

Work was started on the construction of the Horse Creek Wasteway on October 22. About 300 cubic feet of channel were sloped and steel placed on 100 linear feet. Concreting started on the 29th.

Work was continued on the construction of the Lateral 35.4 siphon. During the month 180 lengths of concrete pipe were manufactured for the siphon.

Work was started on the construction of lateral structures on the lateral extension to furnish water to State lands which were recently sold at auction.

The construction of structures on the Cherry Creek Lateral system was completed.

The contract for the construction of lateral extension in division No. 1 was completed on the 7th. Bids were opened on October 22 for the excavation of laterals near the Howard Siphon on the Fort Laramie Canal. The contract was let to C. R. Lacy, at 19½ cents per cubic yard. Wess Gletty completed his contract for hauling gravel for structures on the Fort Laramie Canal and the Springer Lateral system. Bids were opened on the 27th for hauling 440 cubic yards of gravel for the Horse Creek Wasteway. The contract was let to S. L. Smith, at \$1.70 per cubic yard.

**Northport district.**—Work was continued by the grader outfit operated by Government forces on the construction of fills on the Northport Canal. During the month 9,300 cubic yards of material were placed in fills.

Electric dragline No. 4 continued work on the excavation of the Northport Canal, operating with two shifts daily, excavating 39,974 cubic yards of material, including 1,314 cubic yards of class 2, and completing 1.34 miles of canal excavation. Power for operating the machine is obtained from the Bridgeport power plant, and 16,700 kilowatt-hours were used during the month.

Three and one-half miles of private grounded telephone lines were moved on account of interference from the high-tension lines.

The powder crew drilled 2,632 linear feet of holes and used 6,800 pounds of T. N. T. and 147 pounds of dynamite in blasting classified material ahead of the dragline.

The construction of the Indian Creek camp was completed, and nine drops, two weirs, and one combination structure were completed on the lateral system.

Good progress was made on the five contracts for the excavation of laterals.

**Power system.**—The Lingle power plant was operated continuously throughout the month with three

shifts daily. In addition to the power used for construction purposes, 1,000 kilowatt-hours were delivered to Lingle, Wyo.; 32,600 kilowatt-hours to Torrington, Wyo.; 12,500 kilowatt-hours to Morrill, Nebr.; and 22,300 kilowatt-hours to Mitchell, Nebr.

During the month  $7\frac{1}{2}$  miles of low-tension transmission lines were rebuilt ahead of draglines No. 2 and No. 3.

*Surveys.*—Work was started on the location of the lateral system in the Upper Cherry Creek Valley on the Fort Laramie unit.

Investigations were carried on to determine the ground-water elevations in the territory east of the State line in Nebraska on the Fort Laramie unit.—*H. C. Stetson.*

#### Project weather during October, 1920.

Project.	Station	Temperature, °F.			Precipitation (inches)
		Maximum.	Minimum.	Mean.	
Salt River.....	Phoenix, Ariz.....	98	39	67	0.46
Yuma.....	Yuma, Ariz.....	96	42	68.5	15
Orland.....	Orland, Calif.....	84	39	70.5	1.04
Grand Valley.....	Grand Junction, Colo.....	81	29	52.2	1.29
Uncompahgre.....	Montrose, Colo.....	78	21	49	1.70
Boise.....	Boise, Idaho.....	83	26	48.3	2.34
King Hill.....	Glenns Ferry, Idaho.....	80	16	45	1.85
Minidoka.....	Burley, Idaho.....	86	18	45	2.96
Huntley.....	Ballantine, Mont.....	89	15	44.1	11
Milk River.....	Malta, Mont.....	89	19	45.7	76
St. Mary storage.....	Near Babb, Mont.....	78	19	45.5	1.02
Sun River.....	Fort Shaw, Mont.....	83	19	45.7	89
Lower Yellowstone.....	Savage, Mont.....	92	23	48.6	1.76
North Platte.....	Wynote, Wyo.....	85	16	49.5	2.17
Newlands.....	Fallon, Nev.....	83	17	45	1.76
Carlsbad.....	Carlsbad, N. Mex.....	93	31	62	3.76
Rio Grande.....	El Paso, Tex.....	88	35	65	57
North Dakota pumping.....	Williston, N. Dak.....	86	24	48	92
Umatilla.....	Hermiston, Oreg.....	80	23	51	83
Klamath.....	Klamath Falls, Oreg.....	76	20	56.1	1.92
Belle Fourche.....	Ormand, S. Dak.....	89	15	48.8	1.36
Strawberry Valley.....	Provo, Utah.....	83	21	47.4	1.78
Okanogan.....	Omak, Wash.....	83	25	51.1	51
Yakima:					
Sunnyside unit.....	Sunnyside, Wash.....	84	28	52.5	1.60
Tieton unit.....	Cowiche, Wash.....	73	29	48.2	22
Riverton.....	Diversion dam camp, Wyo.....	76	12	41.0	2.65
Shoshone.....	Powell, Wyo.....	85	15	47.2	T.
Indian projects:					
Blackfoot.....	Browning, Mont.....	71	18	38	T.
Flathead.....	St. Ignatius, Mont.....	76	20	45	2.02
Fort Peck.....	Poplar, Mont.....	91	22	48.2	1.12

#### NEWLANDS PROJECT, NEVADA.

Weather conditions, although not up to the usual October standard, on account of cold, winds, and a small amount of precipitation, were favorable for all project work. A small snowfall occurred on October 18.

On October 14 and 15 District Counsel E. W. Burr and Ethelbert Ward, special assistant to the Attorney General, visited the Fallon office in connection with Truckee River water-right adjudication and other legal matters.

From October 15 to 18 Prof. B. A. Etcheverry, of the University of California, was in Fallon to make investigation and report to the board of directors of the irrigation district upon a petition of certain landowners in division 2 to withdraw from the district.

On October 18 Mr. P. K. de Jager, a Dutch engineer from Java, visited the project for an inspection of Lahontan Dam.

From October 18 to 22 meetings were held daily by the board of directors of the irrigation district for the hearing of protests of water users against the adopted plan for the assessment of drainage benefits.

Assistant Chief Engineer R. F. Walter visited the project from the 26th to 29th, being accompanied to the Spanish Springs Reservoir site, near Reno, October 27 to 29 by the project manager.

*Construction.*—In connection with the Gault Lateral, which was excavated to station 157 + 76.4 during September, 1920, by contract forces, four drops, one check, one turnout, and a wasteway were installed by Government forces. These were minor timber structures. Several other minor timber structures were installed. Painting of buildings at the project shops and yards was continued.

No lateral excavation work was in progress, with the exception of that in the Gault Lateral, 300 feet in length.

One dragline excavator was operated for the reconstruction of the Truckee Canal lower bank at several points south and west of Hazen.

Several parties were occupied during the month in taking topography along the proposed feed canal and dam sites for Spanish Springs Valley Reservoir. Digging of test pits on these sites was also commenced.

Surveys were made of Truckee River power plant power canals to determine capacities, etc., in connection with Truckee River water-right adjudication matters.

Surveys were made in connection with the construction of the Rabjohn Lateral, about 3,000 feet in length, to serve the SE.  $\frac{1}{4}$  of sec. 28, T. 20 N., R. 28 E.

*Settlement.*—Inquiries for land continued to come in, but as there were no desirable lands open for entry no new units were taken. No private land water right applications were accepted during the month.

*Water supply and use.*—At the close of the irrigation season, on October 15 there remained a storage of 81,780 acre-feet in Lahontan Reservoir. The surface of Lake Tahoe dropped 0.21 foot to elevation 6,224.50 feet during the month. The only drafts from Lake Tahoe, in total amount of about 8,808 acre-feet, were for the operation of Truckee River power plants.

*Operation and maintenance.*—The irrigation season closed on October 15. Water was turned out of all the lower project canals except the "T" canal, in which a small flow was maintained. The Truckee Canal was operated for the Lahontan power plant and for storage in Lahontan Reservoir.

The taking of the 1920 agricultural census was commenced by the ditchriders.

Trees and willows were cleared from several miles of laterals and a small amount of cleaning was done, using scrapers.

The Carson Lake pasture was operated.—*John F. Richardson.*

#### CARLSBAD PROJECT, NEW MEXICO.

The weather during the first half of October was clear and warm; the latter half of the month was cloudy, with cool nights. A general rain fell on the 25th and the precipitation amounted to 3.71 inches at Carlsbad.

The only work accomplished consisted of storing in the Government corral lot at Carlsbad small quantities of sand and gravel from Pecos River for future use in the construction of farm turnouts and weirs, the construction of a few forms for minor structures and minor repairs to lateral turnouts.



The total run-off of Pecos River averaged 183 acre-feet per day, or 5,680 acre-feet for the month; the maximum flow was 350 acre-feet on October 1 and the minimum 115 acre-feet on October 10.

Labor conditions remained normal with sufficient cotton pickers on the project farms.

Practically all of the last cutting of alfalfa had been harvested at the close of the month. Twenty-seven cars of alfalfa were shipped, at prices averaging \$22 per ton. One car of alfalfa seed was shipped from Loving; the bulk of this crop is being held, however, for better prices. Cotton picking continued throughout the project and 1,782 bales had been ginned at the end of the month. Shipments totaling 161 bales were made during October. The delayed period of early frost resulted in an increased yield of the cotton crop. The best price offered for Durango 1 $\frac{1}{8}$ -inch staple was 28 cents at the close of the month, and only a few sales had been made. Cotton seed was quoted at \$16 per ton. The four cotton gins were operated throughout the month, except for a few days after the storm of the 25th.—*Victor L. Minter.*

#### RIO GRANDE PROJECT, NEW MEXICO-TEXAS.

The weather for October averaged 8° above normal, but there were light frosts, killing sweet potatoes and cotton, 10 days to two weeks earlier than the average date. Light frosts occurred in the Rincon Valley on the night of October 11, in the Mesilla Valley on October 14, and in the El Paso Valley on October 15.

The inflow into the reservoir amounted to 14,674 acre-feet for the month. The gates at Elephant Butte Dam were closed on the 15th, and will be opened again on the 1st of November for a run of water of 15 days. There were 9,900 acre-feet of water delivered to farmers during the month of October.

Maintenance work consisted principally of preparation for the general fall cleaning. One of the cylinders in the check at the head of Dona Canal broke loose from the guides owing to failure of a concrete pier. This was repaired during the month. The small portion of the riprap at Percha Dam shifted downstream owing to action of the water at that point. The damage is slight and repairs will be made during November.

Ditch riders were collecting information regarding the extent and condition of crops, and these data will appear in the annual project history. Cotton was being picked, and all gins were operating, baling 2,766 bales during the month.

Several units of the Farm Bureau at Las Cruces have consolidated and formed the Farm Bureau Marketing Association with headquarters at Las Cruces. They have purchased a building for curing sweet potatoes, and are prepared to market poultry, eggs, fruit, hogs, and sweet potatoes.

Visitors on the project during the month were Mr. Guttman from Spring Valley, Calif.; J. R. Yates, assistant engineer from Carlsbad; C. J. Blanchard and R. B. Dame from Washington; and Mr. Kemp with a delegation of business men from Wichita Falls, Tex. The delegation from Wichita Falls was inspecting the project with the view of constructing an irrigation project at Wichita Falls. They were entertained at Elephant Butte Dam by the project manager.

At Elephant Butte the construction plant and roads were being installed for the spillway channel and embankment paving construction. Considerable construction material arrived at Engle.

In the Rincon Valley the only construction work in progress was the operating of the 1-T dragline on the Garfield Drain, excavating 22,000 cubic yards in 2,540 feet. In the Mesilla Valley only two machines worked on drains, and both of these for only a part of the month. The Bucyrus machine working on the Dona Ana Drain was delayed at the railroad awaiting the structure installation from the 11th on, and the 2-T was being transferred from the Selden Drain to the Del Rio Drain, beginning the move on the 12th. Two machines were at work on canals, one on the La Union enlargement and one on the Santa Tomas Rover Lateral and levy, and the Marion dragline began the reconstruction of the Canutillo Lateral. The Clark Lateral near Mesilla was reconstructed by team; three concrete checks were installed in the La Union Main. In the El Paso Valley one Bucyrus worked on the Playa Drain, and one on the Fabius Drain, and the old 1-T Monighan worked on the Franklin Feeder enlargement. All canal sections are being lined on fills over drain culverts. To date 185 miles of open drain have been constructed, involving 9,226,000 cubic yards of excavation, making the drainage system 60 per cent complete.—*L. M. Lawson.*

#### NORTH DAKOTA PUMPING PROJECT.

October weather conditions were nearly normal and were favorable for the work in hand. The precipitation was 0.92 inch, which was 0.15 inch above normal, and shows a deficiency of 0.92 inch for the year.

About 4,000 yards of silt were removed from the settling basin by an improvised sluicing process before the pumping barge was docked. The ways were replaced, the barge was docked, and repairs to the barge were begun. Extreme low water in the Missouri River increased the difficulty of docking the barge and damaged the bank capstans somewhat.

Owing to the high price demanded for team work, practically all maintenance work requiring teams was postponed to the spring of 1921.

Labor conditions continued bad. A conference of mine scale committee and operators awarded an increase of \$1.50 per day to day laborers in the coal mine, which will effect a considerable increase in coal costs.

Several partially worked-out rooms in the coal mine were lost, owing to an extensive "creep" and slide of the overburden. Four coal cars and the pumping equipment were buried beyond recovery.

The power plant was operated for the commercial power contract; 107,100 kilowatt-hours of electrical energy were delivered to the city. This represents an increase of 7,750 kilowatt-hours over the same month of last year.

Eight hundred and eighty-five tons of coal were mined.—*Wm. S. Arthur.*

#### UMATILLA PROJECT, OREGON.

October weather conditions were normal.

The harvesting of the third crop of alfalfa was very late and some losses were sustained because of rain. Seventy-five cars of baled and chopped alfalfa and some small lots of potatoes, apples, and hay were shipped during the month.

Labor conditions were easy, as the settlers on the project found welcome employment on construction work.

Little maintenance work was done during the month. The work of establishing seepage wells in the Boardman district was completed and some maintenance was necessary in preparation for the operation of the Feed Canal.

The irrigation season on the East Side closed on September 30 and on the West Side on October 31. The demand for water on the West Side decreased materially toward the close of the month. Operation of the Feed Canal for storage began October 19. A head of from 116 to 248 second-feet was diverted continuously thereafter, of which 30 second-feet and from 90 to 193 second-feet were delivered continuously to the Echo Mills and Cold Springs Reservoir, respectively. The field work connected with the crop census was practically completed and results were being tabulated at the project office.

Small construction work involved pipe manufacture and miscellaneous construction on three supplemental construction districts on the East Side and on Lateral 17c on the West Side. Work on the concrete lining of Canal A continued throughout the month, good progress being made, and 1,040 cubic yards of concrete placed. Good progress was also made on excavation in connection with the enlargement, and at the close of the month concreting was being prosecuted with two small mixers, about 275 feet of ditch being lined per day, representing about 70 cubic yards of concrete.

On October 2 Messrs. George Tompkin and H. F. Stone, who are connected with the Biological Survey of the Department of Agriculture, visited the project. They inspected the reservoir at Three Mile Falls Dam in connection with the proposal to make this reservoir a Federal game preserve. Paul de Jager, a Dutch engineer on his way to Java, spent October 5 in an examination of Cold Springs and Three Mile Falls Dams. On October 8 and 9 Examiner of Accounts F. G. Hough was on the project in connection with official business. On October 18 and 19 Señor Carlos Volpi, an engineer from the Argentine Republic, visited the project inspecting irrigation works. On October 22 the project was visited by Messrs. Gebbie and Gemmell, of India. These two English engineers visited Cold Springs and Three Mile Falls Dams and were much interested in the concrete lining of canals. J. C. Moody, an engineer of the Flat-head project, spent October 24 and 25 in an inspection of irrigation works. A. H. Gullickson, chief accountant, visited the project on October 28 in connection with official business.—*Maurice D. Scroggs.*

#### KLAMATH PROJECT, OREGON-CALIFORNIA.

On October 18 snow fell to a depth of about 3 inches.

The second cutting of alfalfa was completed early in the month. The harvesting of the project grain crop was finished and thrashing will be completed early in November. In general, all farm crops were above the average.

On the Tule Lake leased lands harvesting was still in progress. The snowfall on the 18th crushed some of the standing grain. An attempt was being made to harvest the fallen grain, but the work is very difficult and it is probable that some of it will not be harvested. In general, however, large returns were being received by the parties leasing the Tule Lake lands. Practically all of the Tule Lake grain crops were being hauled to Klamath Falls by motor truck, a distance of 30 miles.

In spite of many difficulties good progress was made on the concrete lining job on the C Canal and it is expected that the work will be completed in November. During the month 2,800 feet of concrete lining were completed, which involved the placing of 785 cubic yards of concrete. After the 15th concrete less than three days old was housed in with canvas and protected against freezing.

From 25 to 40 men were employed on the lining job and it was extremely difficult to maintain a working force. Two trips were made to Portland and one to San Francisco to secure laborers. The wages paid were \$6 per day for concrete men and \$5.50 per day for common labor.

Three small crews were engaged all month in making repairs to minor structures. The field work of taking the annual crop report was nearly completed.

The Monighan dragline excavator No. 122235 worked from the 1st to the 15th on the No. 31 drain from station 54+70 to 93, a total distance of 3,830 feet, which involved the excavation of 11,694 cubic yards of material. From the 15th to the 19th the machine was moving to the Upper Van Brimmer District. From the 19th to the 31st the machine excavated from station 42 to 9 (3,300 feet) of the Upper Van Brimmer drain, which involved the excavation of 10,104 cubic yards of material. The machine was operated during three shifts all month.

One survey party was engaged all month on the final location of the J Canal and in giving grades for the concrete lining job.

F. G. Hough, examiner of accounts, was on the project from the 20th to the 27th, inclusive.—*Herbert D. Newell.*

#### BELLE FOURCHE PROJECT, SOUTH DAKOTA.

October weather was most favorable for outdoor work. Three-tenths inch of rain fell on the 12th and 13th and four-tenths inch on the 22d. On the latter date two days were lost on canal work. Roads were excellent.

Canal operations were shut down in September. The Inlet Canal was not in operation during October on account of the necessity of making repairs to rip-rap at the diversion gates and to the concrete drop to the reservoir. October has seen the biggest repair program carried out that the project has ever experienced. Short labor conditions during the war, when it was necessary to curtail operations, followed by freezing weather early in October of last year, and the wettest spring on record this year, made it imperative that a great amount of cleaning of small laterals be accomplished before another season, otherwise it would be impossible to make satisfactory delivery of water to extensive areas of the project. Fortunately the weather was most favorable and canals dried out rapidly. Short crops and stringent financial conditions, while deplorable, nevertheless were a potent factor in furnishing abundant team labor, although single-handed men were short nearly all month. As soon as ditches were in condition to work, small local parties of from 3 or 4 to 10 or 12 teams were organized all over the project under the immediate direction of ditch riders and straw bosses, each district being supervised by the regular foreman. The work progressed very satisfactorily, and at the close of the month only about 3 or 4 miles of laterals yet to be cleaned remained of the original program. On account of a heavy snow on the 31st it is thought probable that no more ditch work can be done this fall. The work accomplished consisted of completion of repair to Inlet Canal Drop (except setting of gates), the partial replacing of a 5-foot concrete culvert under the North Canal at mile 8, finishing the Town-site Lateral siphon (except back fill of 500 feet), and the cleaning of 83 miles of laterals, 39 miles of which were of 10 second-foot capacity or more. The average force employed was 67 men and 121 horses, and the maximum daily pay roll was approximately \$1,330.



Ten days more open weather would have cleaned everything up in fine shape.

One survey party of three men was in the field all month making irrigable area determinations in the Willow Creek unit. Test borings in the Chicken Creek Reservoir site were begun under Mr. Towle's supervision on the 3d of the month. Three holes were drilled to a depth of 150 feet each and a fourth to 20 feet. No unusual formations were encountered, practically the entire depth being through red rock or red beds material.

A. H. Gullickson, chief accountant, visited the project during the month. He arrived on the 1st and was taken by the project manager to Deadwood on the 3d. While here he divided his time between office inspection and a general survey of the project.

Team labor was plentiful, but single-handed labor very scarce. This condition was due to the absence of floating labor.

All crops have been harvested and nearly all grain thrashed. The yield was very light, owing to rust, and many fields were not cut. Alfalfa seed crop was a failure. Much of the beet crop was harvested and marketed. The yield is good and the price fair—\$10.50 per ton by contract. Farmers say that the beet grower is the only man on the project this year who has made any money, and the statement seems to be true.—*B. E. Hayden.*

#### STRAWBERRY VALLEY PROJECT, UTAH.

October was unusually wet and stormy. At East Portal of Strawberry Tunnel the precipitation was 2.85 inches and at Provo 3.78 inches.

*Farming operations.*—The harvesting of all crops on the project has been completed with the exception of the sugar-beet, apple, and potato crops, work on which was practically suspended from October 13 to 26 on account of the exceptionally heavy rains and snow.

*Hydrographic data.*—The gates at East Portal of Strawberry Tunnel were shut down on the 9th and the irrigation season was brought to a close. During October 1,031 acre-feet of water were delivered to the High Line unit for irrigation purposes; 411 acre-feet to the Spanish Fork unit; and 200 acre-feet to the Mapleton and Springville irrigation districts; the total amount of water delivered during October was 1,642 acre-feet; and the total for the irrigation season was 69,011, of which 63,062 acre-feet was water from Strawberry Reservoir.

*Labor conditions.*—Common labor and teams were scarce and probably will continue so until after the harvesting of the sugar-beet crop. Skilled labor, on the other hand, was fairly plentiful and no great trouble was experienced in obtaining an ample amount when desired.

*Operation and maintenance, storage system.* Operations at West Portal of Strawberry Tunnel were continued throughout the month and consisted mainly in camp betterments, quarry work, and operation of the crushing plant. The work was greatly retarded on account of the scarcity of common labor and teams and the excessive precipitation at West Portal. A set of rolls and a 50-horsepower fuel engine were purchased for operation of the crushing plant.

The power plant was operated without serious interruption, and power was furnished to the towns of Spanish Fork, Salem, Payson, and Springville. Tentative drawings covering the alterations to the exciter units were received from the Denver office and checked.

The telephone and transmission lines were operated without trouble.

*Settlement.*—Only one supplemental water application was received and accepted.

*General.*—Water allotment to lands embraced under the Santaquin irrigation district is being made by the State engineer.

The formation of the drainage district embracing land along Payson Slough and Beer Creek is proceeding favorably and petition will be presented to the governor in a short time for his signature.

A final report on the grazing leases was forwarded to the Denver office on the 11th and final action thereon is shortly expected.—*W. L. Whittenmore.*

#### Summary of employees for October, 1920.

Projects.	Beginning of month.	End of month.	Increase.	Decrease.
Yuma.....	131	135	4	
Yuma Auxiliary.....	7	7		
Orland.....	36	74	38	
Grand Valley.....	75	79	4	
Uncompahgre.....	66	71	5	
Boise.....	188	210	22	
King Hill.....	217	281	64	
Minidoka.....	120	115		5
Huntley.....	34	50	16	
Milk River.....	47	81	34	
St. Mary Storage unit (including half time of 8 employees on Blackfeet).....	38	37		1
Sun River.....	37	63	26	
Lower Yellowstone.....	31	42	11	
North Platte.....	107	427	20	
Newlands.....	64	72	8	
Carlsbad.....	15	13		2
Rio Grande.....	377	480	103	
North Dakota pumping.....	46	38		8
Umatilla.....	50	75	25	
Klamath.....	70	89	19	
Belle Fourche.....	90	219	129	
Strawberry Valley.....	41	43	2	
Okanogan.....	23	11		12
Salmon Lake-Okanogan.....	81	82	1	
Yakima.....	112	156	44	
Riverton.....	48	35		13
Shoshone.....	165	241	76	
Denver office.....	77	80	3	
Blackfeet (including half time of 8 employees on St. Mary).....	25	14		11
Flathead.....	173	150		23
Fort Peck.....	21	19		2
Field legal offices.....	25	25		
Washington office.....	91	92		2
Unassigned per diem.....	35	35		
Examiners' force.....	2	1		1
Total employees.....	3,068	3,642		
Increase.....			654	
Decrease.....				80
Net increase.....				574

#### OKANOGAN PROJECT, WASHINGTON.

The first half of October remained cool and somewhat cloudy, with four light rains, which added materially to the watering of the soil. Cooler weather prevailed during the last half of the month, with no precipitation.

Water was run continuously from the 1st to 16th of the month for irrigation. Only about 700 acres were irrigated at one time, owing to the small supply available, as all the water that was pumped from Salmon Lake Reservoir and that coming from the creek was being used as it was supplied. The pumping plants at Salmon Lake were shut down on October 13. The pumping plant at the diversion dam well was shut down on October 14. Robinson Flat and the gen-

erating plant at Omak were shut down on October 10. The closing down of these several plants finished up the irrigation for the season. From Salmon Lake pumping there were furnished 258 acre-feet, and from Salmon Creek 175 acre-feet, making a total let out of Conconully Reservoir for October of 433 acre-feet.

At the end of the month the apple crop was all harvested, nearly all of it being placed in storage or packed out and hauled to warehouses at the railroad for shipment. The crop was light, and the prices at the close of the month were unsatisfactory for the later varieties of apples.—*Calvin Casteel*.

#### STORAGE UNIT.

The weather during October was favorable for construction work. During the latter half of the month labor became plentiful.

The steam shovel, used during the summer on the Salmon Lake road construction, was moved back, over the completed road, to the dam site, on the way loading surfacing material for the road. Three hundred and sixty-eight cubic yards of solid rock and 1,626 cubic yards of classes 1 and 2 material were excavated from the road section; 9,281 linear feet of road were surfaced, this surfacing being only heavy enough to cover rocks in the loose rock and solid rock cuts.

The steam shovel, with wagon crew, was placed at work on Salmon Lake embankment on October 13; 5,415 cubic yards of earth embankment and 583 cubic yards of rock riprap were placed.

At Conconully Dam 340 linear feet of reinforced concrete parapet wall were placed. —*L. V. Branch*.

#### YAKIMA PROJECT, WASHINGTON.

The prevailing temperature for October was about normal; precipitation was very light.

*Operation and maintenance, Sunnyside unit.*—Operation of the Sunnyside irrigation system was continuous. The diversion was, however, rapidly reduced from 675 second-feet at the beginning of the month to 300 second-feet at the close, an average of 65 second-feet being wasted to furnish power for the operation of pumping plants. Water delivered to the land was in general for irrigation of new seeding and domestic use. The total delivery for the month was 18,702 acre-feet, and for the season 281,261 acre-feet, or 3.05 acre-feet per acre on a total area irrigated of 92,000 acres. The several pumping plants were operated as required during the month, and were closed down for the season, as follows: Outlook, October 26; Snipes Mountain, October 23; Grandview, October 24; Prosser, October 21.

An average force of 12 men, with two trucks, was engaged in replacement of wooden turnouts with concrete on the Snipes and Mabton laterals, and 7 men and a team were employed clearing weeds and willows along canal right of way and pipe lines.

*Tieton unit.*—There was no delivery of irrigation water on the Tieton unit during October, the season having closed on September 30. The ditch riders were employed on cleaning and painting steel flumes and making preparations for the cleaning of main laterals. Owing to shortage of funds the fall program of maintenance is being confined to the most essential work. Four men were employed on repair and replacement of sublateral structures, including replacement of about 1,400 feet of wooden flume with

sewer tile and repair of rock chutes. Maintenance on the Main Canal consisted of resetting 130 linear feet of canal shapes near Wasteway No. 1, which had raised about 6 inches by floating during a period of heavy run-off from the hills that occurred three years ago; and preparations for placing plaster lining in the bottom of both the Tieton and North Fork Tunnels. Rebuilding of the Main Canal transition at the intake of North Fork Tunnel was begun. At the end of the month the old structure had been removed, forms completed, and concrete for the new structure partly poured. Contract was awarded F. C. Howard on October 16 for the construction of two 5-room houses at Tieton headquarters. The contractor started work on the 20th with a force of five men and is making good progress.

*Investigations and surveys for new units.*—A crew of 8 men was engaged on location of the Main Canal for the Roza unit, and the location was practically completed from Mile 14 to 32, the first 14 miles having been located last year. Five men were employed in the office on preliminary plans for the Moxee unit and on maps, etc., for location of the Main Canal of the Roza unit. Funds for this work are provided by the irrigation districts interested under contracts with the United States.

*Cooperative investigations, Pasco project.*—Field work in connection with these investigations was completed and work was begun on compilation of final report. The data secured relative to water duty, character of soil, etc., were worked up and maps prepared.

*Storage unit.*—At Keechelus reservoir clearing and burning of logs and debris was discontinued about October 20. The gate tower sump was pumped out and the gates inspected. A small amount of repairs was necessary.

*Cle Elum Reservoir.*—A small crew was employed in repair work below the apron of the dam, consisting of placing concrete blocks and rock in the river channel.

*Tieton Reservoir.*—The Northern Pacific Lumber Co. continued hauling lumber from the sawmill at Rimrock.

*Visitors.*—M. D. Scroggs, superintendent of irrigation, Umatilla project, on the 7th; C. J. Moody, engineer on the Flathead project on the 23d; A. H. Gullickson, chief accountant, from the 23d to 26th, inclusive. —*J. L. Lutch*.

#### RIVERTON PROJECT, WYOMING.

The temperature during October was slightly less than normal. The precipitation was 2.65 inches, most of which fell as snow on the 20th, 30th, and 31st. The roads have been in very bad condition since the 20th.

Dragline No. 1 was operated one shift from October 3 to 19 and two shifts the remainder of the month. Dragline No. 2 was operated one shift from the 1st to the 26th and two shifts the remainder of the month, excepting from the 5th to 11th, when it was shut down for necessary repairs. The total amount of excavation moved was 21,534 cubic yards, all of which was taken from the canal prism, of which 21,244 cubic yards was class 1 material, being heavy gravel, and 290 cubic yards a soft sandstone requiring blasting. A large amount of sandstone was drilled and blasted, but not yet excavated. Dragline No. 1 was working on the second cut and excavating to canal grade. Dragline No. 2 was stripping gravel from the top of the sandstone during the greater part of the month.



The construction of the telephone line from Riverton to the diversion dam was completed on October 28, communication first being established on the 22d.

A four-room cottage at Riverton and a similar gatekeeper's cottage at the diversion dam were completed during October.

One truck was laid up for repairs during the greater part of the month, but the other truck was able to keep the work supplied.

Consulting Engineer James Munn visited the project from October 11 to 16 and Chief Accountant Gullickson was a visitor on the 9th. The dragline work was visited by Senator John B. Kendrick on October 18 and by Congressman F. W. Mondell on October 19. During the latter's examination of the work he unfortunately fell and sustained a fracture of the right leg.—*H. D. Comstock.*

#### SHOSHONE PROJECT, WYOMING.

October was a pleasant month with little precipitation and well suited to harvesting. The first severe frost of the season occurred on the morning of the 27th.

*Water supply.*—Shoshone Reservoir dropped slowly during the month. The only discharge was from the uncontrolled 42-inch blow-off pipe.

*Operation and maintenance.*—Water was shut out of the canal system on October 1. There were no deliveries in the Garland Division, but 221 acre-feet were delivered on the Frannie Division. Canal cleaning was the principal work of the maintenance force, and 70 miles of laterals and sublaterals were cleaned. This kind of work was practically completed on the Garland Division, but some still remains on the Frannie Division. Other maintenance work consisted of miscellaneous small structure repairs, the installation of a temporary wooden intake on the Ralston Reservoir outlet tower for the benefit of the Powell water supply, and the pumping out of the water from the water cushions on several of the Garland Canal drops to permit their examination and a determination of the amount of repairs necessary.

*Crops.*—The weather was favorable for harvesting. Potatoes have been harvested and the beets were nearly all in. The third cutting of alfalfa was put up and proved better than anticipated, owing to the late date of the first heavy frost. The beet and alfalfa yields were about average. The potato yield was somewhat better than last year. The alfalfa mill at Powell began grinding on the 10th. A large amount of wheat was shipped from the project, but about one-half the potatoes were being stored with the hope of securing higher prices.

*Labor.*—The labor shortage was acute until about the middle of the month when the potato harvest was completed. Since then labor has been fairly plentiful.

*Drainage.*—On the Garland Division the Lidgerwood dragline continued on the excavation of open drain X-92, excavating 3,090 linear feet. The Monighan dragline continued on the upper end of open drain 28, known as drain 28-28, excavating 710 linear feet. Progress was slow because most of the excavation was through sand rock. Bucyrus dragline No. 5 excavated 4,400 linear feet at the lower end of open drain 28. The Austin trencher resumed work October 14 on drain L-13, completing that drain, and then began work on drain X-83; 4,075 feet of drain were constructed. On the Frannie Division the Bucyrus dragline continued the excavation of open drain 102 west of Deaver town site. 1,235 linear feet were

excavated. Progress was slow, owing to the difficult character of the ground encountered.

*Field and office engineering.*—Field work was carried on by one survey crew each on the Frannie and Garland Divisions, mostly in connection with construction and drainage operation. Test wells were also read. On the Frannie Division some land was classified on the third unit. The principal office work consisted of the preparation of a report on water rights of the project.

*Construction.*—On the Frannie Division Government forces practically completed the concrete work on the siphon, station 2010, of the Main Canal. Other concrete construction work consisted of the building of farm and lateral turnouts on the main canal and chutes on the lateral system. Four hundred linear feet of the Frannie Canal in the vicinity of Frannie were puddled during the month. The contractors on the lateral system for the third unit of the Division continued work during the month, excavating 9,800 cubic yards of material.—*J. S. Longwell.*

#### INDIAN PROJECTS, MONTANA.

##### BLACKFEET PROJECT.

October weather conditions were rather more favorable than usual for construction work in this vicinity, there being very little stormy or severe weather, although high winds were common. Up to the 16th the enlargement of Two Medicine Canal by a dragline excavator was continued, and on the Badger-Fisher system a few minor timber structures were placed. The Badger-Fisher system was operated part of the month to deliver water for fall irrigation and supply water for the operation and maintenance force on the Fisher flats.

Maintenance work consisted of work on the upper end of the Two Medicine Canal and on the Fisher distributing system. No work was done on the Two Medicine distributing system. At the end of the month most of the thrashing was done. On the Two Medicine system the crop returns were fair and on the Badger-Fisher system they were very good.—*R. M. Snell.*

##### FLATHEAD PROJECT.

At Dry Fork Dam excavation, including stripping, amounted to 1,620 cubic yards; 20,459 cubic yards of embankment were placed and 834 cubic yards of riprap. In the outlet works 46 cubic yards of concrete were placed and 69 cubic yards of riprap. Concreting has been completed. Spillway excavation amounted to 490 cubic yards.

At Pablo Feeder Canal excavation amounted to 6,819 cubic yards, of which 4,546 were class 1 and 2,273 class 2. This was removed between stations 1400+00 and 1412+00. The work was preceded by moving the steam shovel to station 1412+00 and followed by moving it to station 1246+00, which accounts for the small yardage. Construction of a camp was begun preliminary to the construction of Dry Creek headworks.

The Mission A Lateral system was completed. During the month 722 cubic yards of material were excavated; one rock masonry turnout and 9 grouted drops were constructed and also a number of minor timber structures including 9 farm turnouts, 4 checks, 1 cattle guard, 7 weirs, 2 culverts, and 7 farm gates.

All construction was by Government forces.

The condition of the crops and live stock is good.—*N. B. Hunt.*

## FORT PECK PROJECT.

October weather was favorable for construction work and fall plowing. Labor continued scarce and was unwilling to work at the wages offered.

Construction work was continued on minor structures for Big Muddy unit. Five main canal checks, 1 lateral check, 2 canal turnouts, and 20 farm turnouts were constructed; 438 feet of 18-inch lock-joint pipe were manufactured.

Maintenance work, consisting of burning weeds and raising lateral banks, was carried on at the Little Porcupine and Big Porcupine units.

The weather was favorable for harvesting and all crops had been taken care of. The yield of potatoes was very good. Three irrigable forties were sold during the month.—*R. M. Conner.*

## GENERAL OFFICES.

*Washington office.*—Director Davis was in charge of the office during October, except for the periods from October 11 to 13, when he was in New York in connection with a board meeting of the American Society of Civil Engineers; October 15 to 17, when he was on a trip to South Carolina, where he addressed the South Carolina Development Board at Columbia on the subject of rural settlement; and October 25 to 30, when he was in New York in connection with the proposed American Falls development, and where he was joined by F. E. Weymouth, chief engineer; J. M. Gaylord, electrical engineer; F. A. Banks, engineer on the Minidoka project; and B. E. Stoutemyer, district counsel, Boise, Idaho. During the absence of Mr.

Davis the office was in charge of Morris Bien as acting director.

Page proof of the forthcoming nineteenth annual report was received during the month and was returned to the printer early in November.

During the month 1,075 inquiries from ex-service men concerning opportunities on the land were received and answered. Up to the end of the month a total of 176,654 such inquiries had been received.

Among the visitors during the month in addition to Messrs. Weymouth, Gaylord, Banks, and Stoutemyer, were Col. Scrugham, State engineer of Nevada; Carl Brehme, engineer, of California; W. G. Steward, of Idaho; D. Fitzgerald, past president of the American Society of Civil Engineers; George Christy and A. L. Harris, representing the Paradise-Verde irrigation district; I. Takahashi, of the Imperial University, Kyoto, Japan, and S. Nagai, director of the Nippon Electric Power Co. and chief engineer of the Ujigawa Electric Power Co., Osaka, Japan, who are interested in dam construction in the United States; and F. St. J. Gebbie, C. I. E., and G. Gemmell, of the Indian Service of Engineers.

During the month Capt. E. C. Bebb, engineer, was detailed to the Federal Power Commission, and Miss M. V. Sweetnam, stenographer, was detailed to the same office on November 2. P. J. Leverone, draftsman, was transferred to the National Park Service, and Miss Margaret E. King, bookkeeper, resigned to get married.

The accompanying balance sheet gives the status of cash transactions as of October 31, 1920, and includes all of the operations of the Reclamation Service except Indian projects and Drainage and Cut-over Investigations.

*Consolidated balance sheet of cash, investment, and capital funds, United States Reclamation Service, October 31, 1920.*

	Current month.		Balance.	Subtotal.	Total.
	Debit.	Credit.			
Group 2, Cash:					
1. Cash with treasurer, Reclamation.....	\$204,642.12	\$984,844.50	\$860,067.67		
Cash with treasurer, unadjusted.....	12,870.36	408.04	11,673.80	\$858,393.87	
Cash with treasurer, Yuma Auxiliary.....	406.07	10,000.00	338,537.27	338,537.27	\$1,196,931.14
2. Cash with fiscal agents, Reclamation.....	1,066,024.76	723,237.00	711,576.58		
Cash with fiscal agents, Yuma Auxiliary.....	10,103.20	1,625.07	12,870.57	724,447.15	724,447.15
Group 2, Investment (all funds):					
5. Disbursement vouchers.....	717,151.08		155,880,079.11		
6. Transfer vouchers received.....	79,959.70		8,039,213.74	163,919,292.85	
Less—					
7. Collection vouchers.....		120,173.77	34,327,234.41		
Value of to-own-site sales excluded.....			1512,429.61		
9. Transfer vouchers issued.....		79,959.70	8,039,213.74	41,854,018.54	
Project net investment <sup>1</sup> .....					122,065,274.31
Total.....					123,986,652.60
Group 3, Capital Fund:					
15. Sale of to-own-site lots.....			512,429.61		512,429.61
16. Sale of public lands.....		210,858.18	100,791,475.57		100,791,475.57
17. Potassium rent and royalties.....			6,805.41		6,805.41
18. Bond Loan.....			20,000,000.00		
Less repayments.....	100,000.00		200,000.00		19,800,000.00
19. Rio Grande Dam appropriation.....			1,000,000.00		1,000,000.00
20. Increase compensation.....	324.93	60,375.96	1,389,085.90		1,389,084.96
21. Judgments, Court of Claims.....			444,968.65		444,968.65
22. Yuma Auxiliary sales.....			41,888.40		41,888.40
Total.....	2,191,482.22	2,191,482.22			123,986,652.60

<sup>1</sup> Reduction.

<sup>2</sup> Net investment, reclamation projects.....		\$122,374,793.75
Collections, Yuma Auxiliary.....	\$314,196.80	
Less disbursements.....	4,677.36	
		309,519.44

Net credit investment, Yuma Auxiliary..... 122,065,274.31



Group 1, Cash, shows that on October 31 there were on hand in the Reclamation fund the following amounts:

With the Treasury-----	\$858,393.87
With special fiscal agents-----	711,576.58
Total-----	1,569,970.45

This is nearly a half million less than the previous month. In addition to actual expenditures the fund is now being called upon to return to the United States Treasury the advance of \$20,000,000 commonly known as the Bond Loan. This is being accomplished by a monthly deduction of \$100,000 from the receipts from sale of public lands. The balance sheet shows, under Group 3, Capital Fund, that \$200,000 has been repaid. This represents deductions from the July and August sales, September and October sales not having reached the books of the Treasury.

Group 2, Investment, shows that the net investment in projects is \$122,065,274.31. An analysis of this item shows that the net investment for projects other than the Yuma Auxiliary is \$122,374,793.75, while the Auxiliary has a balance in its favor of \$309,519.44. This is due to the fact that the law under which this project is being constructed requires the water users to advance the funds. The expenditures to date have been \$4,677.36, while the collections amount to \$314,196.80, a difference in favor of the water users as shown above.

The investment is not segregated as to funds, the net representing the amount yet to be returned as a result of expenditures from the Reclamation fund, increased compensation fund, and any special fund such as those for settlement of judgments by the Court of Claims, etc.

Group 3, Capital Fund, shows the sources of the funds being invested in reclamation projects. In addition to the sources named it is expected that there will be available soon a considerable amount from the lease of oil and coal lands under the act of February 25, 1920.

It will no doubt be a matter of interest to our projects offices to learn that a bonded officer operating under one bond may execute a new one effective at a future date. It is now possible for the fiscal agent to execute a new bond without the inconvenience occasioned by an interval between during which he can not act.

Our attention has been called to the large number of special requisitions for funds by the fiscal agents. A requisition for the advancement of funds must necessarily pass through a number of offices, and it is with considerable reluctance that the regular routine is waived. To avoid this it may be necessary in some instances to require larger bonds. During October 32 requisitions were prepared representing withdrawals from the Reclamation fund amounting to \$483,500, and increased compensation \$84,300.

*Denver office.*—The chief engineer was in the Denver office until October 23, when he left for New York and Washington in company with Messrs. J. M. Gaylord, B. E. Stoutemyer, and F. A. Banks in connection with American Falls matters. Assistant Chief Engineer R. E. Walter left on October 18, and by the end of the month had visited the Uncompahgre, Great Valley, Strawberry Valley, Newlands, Orland, and Klamath projects. Assistant Chief Engineer Charles P. Williams spent several days on the Lower Yellowstone project in connection with the irrigation

district contract. During the month official visitors included Messrs. W. J. Eggleston, B. E. Stoutemyer, and F. A. Banks. Other visitors were Messrs. F. St. J. Gebbie, chief engineer of the Indian Irrigation Service, and G. Gemmell, executive engineer, who spent several days in the Denver office prior to visiting a number of the Reclamation projects.

In the designing division preliminary designs and estimates were prepared for reservoirs of varying capacities at both the Black Canyon and Boulder Canyon Reservoir sites on the Colorado River, and work was begun on the estimate for relocating the Arizona Eastern Railroad around the San Carlos Reservoir site. Preliminary designs and estimates were also prepared of the American Falls Reservoir in Idaho, with capacities of 850,000 and 1,500,000 acre-feet, and of the Minidoka Dam enlargement, with a capacity of 1,136,000 acre-feet. Studies were continued on the designs and estimates of the Beaver Creek Reservoir, Sun River project. Numerous designs were prepared for various projects covering concrete flumes, culverts, drops, check wasteways, turnouts, and headworks. Work was also continued on the standardization drawings of turnout gates, radial gates, and cast-iron gates.

The principal work accomplished in the electrical department consisted of inspection of the reservoir outlets of the Pathfinder Dam on the North Platte project; the completion of the drawings for the enlargement of the Burley substation on the Minidoka project; continuation of studies for repairs to the balanced needle valves at the Elephant Butte Dam, Rio Grande project; continuation of work on the preparation of designs and specifications for power plant and hydraulic and electrical apparatus at the Shoshone Dam, Shoshone project; on the details for foundations, building, and discharge pipe for the B Lift pumping plant, Yuma Auxiliary project; and on the preliminary designs and estimates of alternative locations of a 360,000-horsepower plant at the Boulder Canyon Dam on the Colorado River.

Legal consideration was given to the Fort Shaw Irrigation District contract, and also contracts with districts on the Milk River. A contract for cooperative telephone service on the Riverton project was agreed upon. A plan for supplemental construction and payment of deficit on the Huntley project was worked out and approval granted by the Secretary of the Interior.

An average of 501 pieces of mail per day were received during the month; 1,880 disbursement vouchers were paid, amounting to \$458,805.51; 332 advertisements were issued by the purchasing department; and 469 vouchers were prepared, involving a net expenditure of \$176,976.09. Transfers amounting to \$23,549.30 were effected between various projects.—*F. E. Weymouth.*

Everyone who keeps any kind of domestic live stock is eligible to participation in the Nation-wide plan of live-stock improvement.

A wider recognition of good pure-bred sires and definite knowledge showing how to improve domestic live stock are the outstanding results of the "Better Sires—Better Stock" movement.

## ADMINISTRATIVE ORGANIZATION.

## DEPARTMENT OF THE INTERIOR.

Hon. JOHN BARTON PAYNE, Secretary of the Interior.  
 ALEXANDER T. VOGELSONG, First Assistant Secretary.  
 SELDEN G. HOPKINS, Assistant Secretary.  
 CHARLES D. MAHAFFIE, Solicitor for the Interior Department.  
 JOHN HARVEY, Assistant to the Secretary.  
 E. J. AYERS, Chief Clerk and Superintendent of Buildings.

## U. S. RECLAMATION SERVICE.

## WASHINGTON OFFICE.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamel, chief counsel; J. B. Beadle, director's assistant; C. J. Blanchard, statistician; Hugh A. Brown, editor; C. A. Bissell, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk; E. G. Hough, Yakima, Wash., and H. N. Bickel, Denver, Colo., examiners of accounts.

## DENVER OFFICE.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Medsel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; L. J. Foster, office engineer; J. M. Luncey, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

## FIELD LEGAL OFFICES.

**Boise, Idaho.**—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement; R. M. Patrick, district counsel located at Burley, Idaho.

**Denver, Colo.**—Law section office of chief engineer; E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

**El Paso, Tex.**—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

**Helena, Mont.**—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfoot, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

**Mitchell, Nebr.**—J. N. Beardslee, district counsel. Projects: North Platte and Belle Fourche.

**Montrose, Colo.**—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

**Portland, Oreg.**—H. L. Holgate, district counsel; D. G. Tyree, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

**San Francisco, Calif.**—Henry A. Cox, district counsel, 349 Pacific Building. Projects: Salt River, Yuma, Orland, and Newlands.

## PROJECT ORGANIZATION.

**Belle Fourche Project.**—B. E. Hayden, project manager, Newell, S. Dak.; R. C. Walker, chief clerk; August Lewin, fiscal agent.

**Boise Project.**—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauff, fiscal agent.

**Carlsbad Project.**—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

**Grand Valley Project.**—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

**Huntley Project.**—W. M. Green, project manager, Balantine, Mont.; G. H. Bolt, chief clerk; Miss L. C. Drinkwater, fiscal agent.

**King Hill Project.**—Walter Ward, project manager, King Hill, Idaho; R. B. Smith, chief clerk; L. D. Eakin, fiscal agent.

**Klamath Project.**—H. D. Newell, project manager, Klamath Falls, Oreg.; W. A. Meyer, chief clerk; G. R. Barnhart, fiscal agent.

**Lower Yellowstone Project.**—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk; Miss Ruth Lundin, fiscal agent.

**Milk River Project.**—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; J. T. M. Culbertson, fiscal agent.

**Minidoka Project.**—Barry Dibble, project manager, Parley, Idaho; F. A. Banks, engineer; E. C. Diehl, chief clerk; Miss A. J. Larson, fiscal agent.

**Newlands Project.**—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

**North Dakota Pumping Project.**—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melas, fiscal agent.

**North Platte Project.**—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

**Okanogan Project.**—Calvin Casteel, project manager, Okanogan, Wash.; W. F. Kubach, chief clerk and fiscal agent; L. V. Branch, engineer, Concoquilly, Wash.

**Orland Project.**—A. N. Burch, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

**Rio Grande Project.**—L. M. Lawson, project manager, El Paso, Tex.; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

**Riverton Project.**—H. D. Comstock, project manager, Riverton, Wyo.; G. H. Baird, chief clerk; J. C. Thraill, fiscal agent.

**St. Mary Storage Unit.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

**Salt River Project.**—Being operated by the Salt River Valley Water Users' Association; C. C. Cragin, general superintendent and chief engineer, Phoenix, Ariz.

**Shoshone Project.**—J. S. Longwell, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; W. E. Sha, chief clerk; L. H. Kline, fiscal agent.

**Strawberry Valley Project.**—W. L. Whittemore, acting project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

**Sun River Project.**—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

**Umatilla Project.**—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

**Uncompahgre Project.**—P. J. Preston, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

**Yakima Project.**—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crownover, engineer; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

**Yuma Project.**—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; E. R. Schepplermann, chief clerk; E. M. Philebaum, fiscal agent.

## INDIAN PROJECTS.

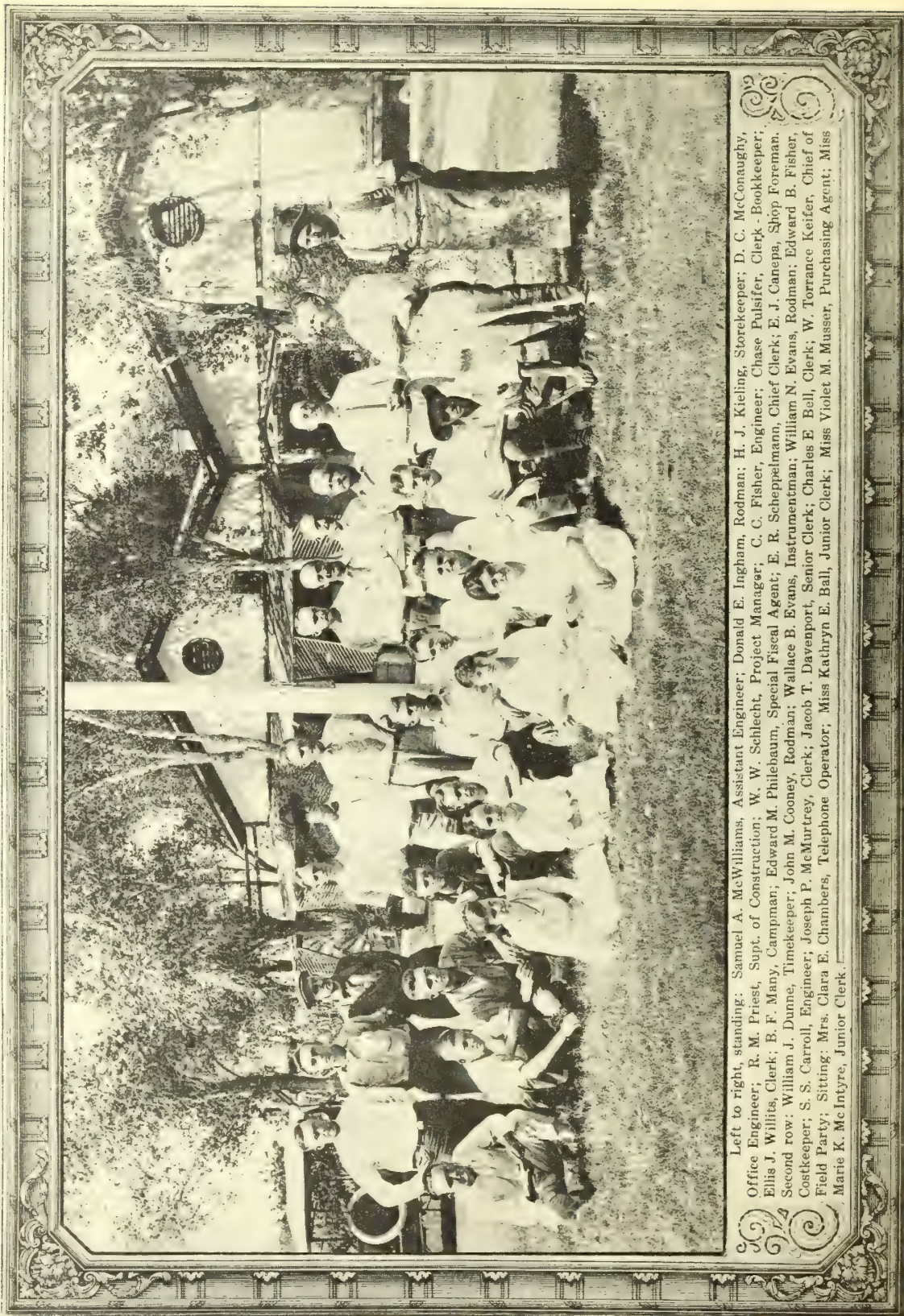
**Blackfoot Project.**—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk and fiscal agent.

**Flathead Project.**—E. A. Moritz, project manager, St. Ignatius, Mont.; C. J. Moody, engineer; J. M. Swan, acting chief clerk; J. P. Siebeneicher, fiscal agent.

**Fort Peck Project.**—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

WORK AND SAVE. BUY GOVERNMENT SECURITIES.





Left to right, standing: Samuel A. McWilliams, Assistant Engineer; Donald E. Ingham, Rodman; H. J. Kieling, Storekeeper; D. C. McConaughy, Office Engineer; R. M. Priest, Supt. of Construction; W. W. Schlecht, Project Manager; C. C. Fisher, Engineer; Chase Pulsifer, Clerk; Bookkeeper, Ellis J. Willis, Clerk; B. F. Many, Campman; Edward M. Philebaum, Special Fiscal Agent; E. R. Scheppelmann, Chief Clerk; E. J. Canepa, Shop Foreman, Second row: William J. Dunne, Timekeeper; John M. Cooney, Rodman; Wallace B. Evans, Instrumentman; William N. Evans, Rodman; Edward B. Fisher, Costkeeper; S. S. Carroll, Engineer; Joseph P. McMurtrey, Clerk; Jacob T. Davenport, Senior Clerk; Charles E. Bell, Clerk; W. Torrance Keifer, Chief of Field Party; Sitting: Mrs. Clara E. Chambers, Telephone Operator; Miss Kathryn E. Ball, Junior Clerk; Miss Violet M. Musser, Purchasing Agent; Miss Marie K. McIntyre, Junior Clerk.











